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Firecode

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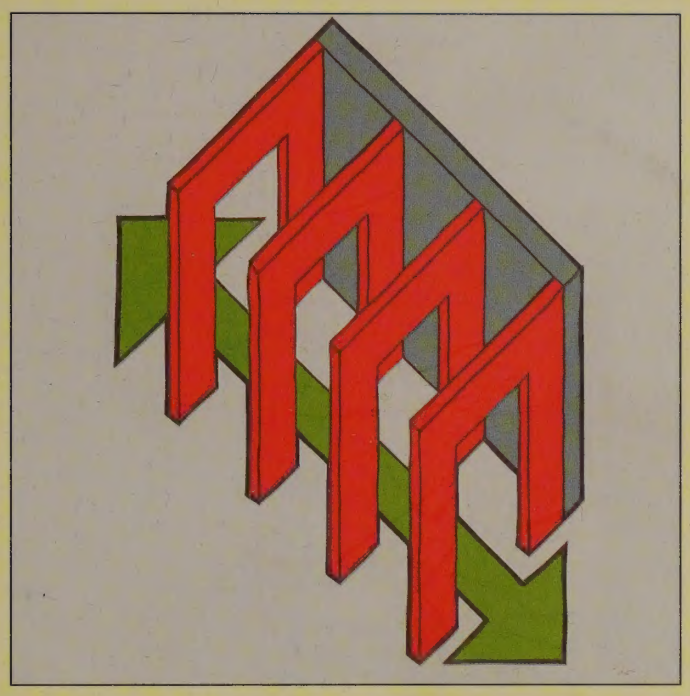
Health Technical Memorandum 81

Fire precautions in new hospitals



NHS Executive

NHS Estates
An Executive Agency of the Department of Health

Firecode

Health Technical Memorandum 81

Fire precautions in new hospitals

London: HMSO

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An Executive Agency of the Department of Health

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The price of this publication has been set to make some contribution to the costs incurred by NHS Estates in its preparation.

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About this publication

This Health Technical Memorandum (HTM) provides guidance on the design of fire precautions in new hospitals and major extensions to existing hospitals. It supersedes the existing document of the same name first published in 1987. In relation to the design of new hospitals, this document also supersedes the guidance in Nucleus Fire Precautions Recommendations published in 1989.

HTM 81 is a code of practice which recognises the special requirements of fire precautions in the design of new hospital premises and should allow the current statutory regulations to be applied sensibly within a framework of understanding. Fire safety is not dependent only on the physical fire precautions provided, and HTM 81 recognises the interaction between physical fire precautions, the dependency of the patient, the fire hazards within the hospital, the management policies, and the availability of sufficient and adequately trained staff in achieving an acceptable level of fire safety within hospitals.

The guidance in this Health Technical Memorandum satisfies all the requirements of Part B of Schedule 1 of the 1991 Building Regulations.

HTM 81 has been prepared by a working group chaired by NHS Estates and in association with the National Fire Policy Advisory Group (NFPAG) which is chaired by NHS Estates and includes:

- the Home Office;
- the Department of the Environment;
- the Chief and Assistant Chief Fire Officers' Association;
- the Fire Research Station;
- the National Association of Hospital Fire Officers; and
- representatives from the NHS.

The primary remit of NHS trusts with regard to fire safety is the safety of patients, visitors and staff. For all premises under their control, trusts will need to select and effectively implement

a series of measures to achieve an acceptable level of fire safety, taking into account:

- the guidance in this Health Technical Memorandum;
- the relevant guidance contained in other parts of Firecode;
- all relevant legislation and statutes;
- the advice and approval of local building control and fire authorities.

The Home Office will distribute this Health Technical Memorandum to all chief fire officers and has recommended that it be used in conjunction with other parts of Firecode, when advice is sought from fire authorities.

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1.0 Introduction and scope

General application

1.1 This technical memorandum provides recommendations and guidance for designers, on the fire safety measures which should be incorporated into the design of new hospitals. It supersedes HTM 81 (first published in 1987), HTM 81 Supplement 1 and Nucleus Fire Precautions Recommendations. It comes into operation on 1 September 1996.

1.2 It should be used in the design of:

a. new NHS hospitals;

b. major new extensions to existing NHS hospitals;

c. major alterations to existing NHS hospitals;

d. change of use of an existing building into an NHS hospital;

e. those parts of an existing NHS hospital which are used as means of escape from a new hospital extension.

It is not possible to accurately define "major alterations"; capital cost and area are not necessarily reliable guides. It is left to the professional judgement of the project team in consultation with the enforcing authorities to determine whether the guidance in this document is appropriate to a particular project.

1.3 Guidance on fire safety in existing hospitals is available in HTM 85 – 'Fire precautions in existing hospitals'. Guidance on fire safety in existing Nucleus hospitals is available in 'Nucleus fire precautions recommendations'.

1.4 HTM 81 should be used as guidance on fire safety in all parts of a hospital, including departments or areas providing ancillary services which are planned as an integral part of a hospital building.

Non-NHS hospitals

The Registered Homes (Northern Ireland) Order 1992

1.5 This document may also be used as good practice guidance for the provision of fire precautions in new non-NHS hospitals registered under Part II of the Registered Homes Act 1984.

Alternative solutions

1.6 The range of NHS premises providing patient care facilities is extensive, and the guidance in this document may not be appropriate for all types of building. However, it is expected that NHS clients, designers, and building control and fire authorities, will exercise a degree of judgement based on a full understanding of the problem and taking into account such things as:

- the type of care being provided;
- the mobility of the patients;
- the planned staffing levels;
- the age of the patients;
- the size of the premises.

1.7 This document describes one way of achieving an acceptable standard of fire safety within new NHS hospitals, but it is recognised that there may be other ways of achieving a similar standard by adopting a fire safety engineering approach. There is no obligation to follow the guidance in this document. A fire safety engineering approach that takes into account the total fire safety package can provide an alternative approach to fire safety. If an alternative approach is used, the responsibility is placed upon the user to demonstrate that the approach achieves similar fire safety objectives to this document.

1.8 Any new building which does not provide departments to which patients have access and which is:

a. detached from the main hospital; or

b. joined to the main hospital by a linking corridor which contains no accommodation

should be designed in accordance with the guidance in the Department of the Environment's Approved Document to Part B of Schedule 1 of the 1991 Building Regulations together with other appropriate guidance.

Status of guidance

1.9 HTM 81 is a Code of Practice prepared by a working group under the direction of the Department of Health's National Fire Policy Advisory Group and has no statutory force; it is a set of standards which recognises the problems special to hospitals. It should allow the current statutory regulations to be applied sensibly within a framework of understanding. The measures in this document satisfy all the requirements of Part B of Schedule 1 of the 1991 Building Regulations.

Northern Ireland – Part E of the Building Regulations (Northern Ireland) 1994

1.10 When using this document it is important to recognise that it is not possible to make comprehensive recommendations covering all eventualities and it should always be borne in mind that the purpose of hospitals is to provide medical treatment and/or nursing care. The complex nature of hospitals will sometimes require a more flexible approach to ensure that the correct balance is achieved between fire safety and the requirements for treatment and nursing care. This should be done on the basis of professional judgement and an understanding of the nature of the problems. However, care should be taken to avoid compromising the safety of patients, visitors and staff.

1.11 In the design of hospitals no reliance is placed on external rescue by the fire brigade or manipulative types of escape appliance such as chutes or portable ladders. This document has been prepared on the basis that in an emergency the occupants of any part of a hospital should be able to move, or be moved, to a place of relative safety with assistance from staff only.

Scope of HTM 81

1.12 The central purpose of this document is to provide guidance on the standards of fire safety expected in new NHS hospitals. As fire safety is not dependent only on the physical fire precautions provided, this document also considers the fire safety implications of:

a. the dependency of the patient;

b. fire hazards within the hospital;

c. management policies; and

d. availability of sufficient and adequately trained staff.

Use by competent persons

1.13 The guidance in this document has been prepared on the understanding that it will be used by competent persons who have sufficient technical training and actual experience or technical and other qualities, both to understand fully the dangers involved and to undertake properly the measures referred to in this document.

Consultation

1.14 Because of the complex and changing nature of hospitals and the often conflicting requirements between fire safety and nursing care, it is essential that early consultation takes place between the design team, the client, the hospital fire safety adviser and all relevant enforcing authorities. Depending on the nature of the scheme it may also be advantageous to involve the client insurers in the consultation process.

1.15 It is not possible to provide absolute safety from fire. The guidance in this document should reduce the risk to patients, visitors and staff as far as is reasonably practicable.

Fire safety during building operations

1.16 A significant number of fires occur as result of building activity. The site activities of contractors should be adequately supervised and controlled. The trust should ensure that adequate precautions against fire are in place and the specialist fire safety adviser should maintain regular contact with contractors to ensure that the local fire safety policy is being complied with.

1.17 Guidance on fire safety on construction sites is provided by:

a. 'Fire prevention on construction site'[1];

b. 'Standard fire precautions for contractors engaged on Crown works'[2].

Note: (1) A joint code of practice published by the Building Employers Confederation, the Loss Prevention Council, and the National Contractors Group (ISBN 0-902167-17-0).

(2) Published by Department of the Environment, HMSO (ISBN 0-11-75223-5).

Other Firecode guidance

1.18 The guidance in HTM 81 has been prepared on the understanding that the new hospital or hospital extension, when completed, will be managed in accordance with the guidance in Firecode: 'Policy and principles' and HTM 83 – 'General fire precautions'. The contents of the hospital should as far as practicable comply with guidance in HTM 87 – 'Textiles and furniture'.

1.19 This HTM should also be read in conjunction with the guidance contained in the latest revisions of the following Firecode documents:

Policy and principles;

HTM 82 Alarm and detection systems, 1996 edition;

HTM 83 Fire safety in healthcare premises – General fire precautions;

HTM 85 Fire precautions in existing hospitals;

HTM 84 Fire safety in residential care premises;[1]

HTM 86 Fire risk assessment in hospitals;

HTM 87 Textiles and furniture;

FPN 1 Laundries;

FPN 3 Escape bed lifts;

FPN 4 Main kitchens in hospital premises;

FPN 5 Commercial enterprises on hospital premises;

FPN 6 Arson prevention and control in NHS healthcare premises;

FPN 7 Fire precautions in patient hotels;

FPN 8 Atria on hospital premises;

FPN 10 Fire precautions in hospital laboratries.

(1) Northern Ireland only.

2.0 Glossary of terms

2.1 For the purposes of this document the following terms are defined:

- **auto-suppression:** mechanical methods of fire suppression which are activated automatically – such systems may include water sprinklers and CO_2 flooding systems;
- **basement storey:** a storey with a floor which at some point is more than 1.2 m below the highest level of ground adjacent to the outside wall;
- **cavity barrier:** a construction provided to close a concealed space against the penetration of smoke or flame, or provided to restrict the movement of smoke or flame within such a space;
- **circulation space:** the communication routes both within the department/management unit and giving access to other parts of the hospital, and to all necessary fire escape exits;

Class 0 is not a classification identified in any British Standard test

- **class 0 surface spread of flame:** the classification achieved by a material or composite product which is either:
  a. composed throughout of materials of limited combustibility; or
  b. a class 1 material (when tested in accordance with BS476: Part 7: 1971 or 1987) which, when tested in accordance with BS476: Part 6: 1981 or 1989, has a fire propagation index (I) of not more than 12 and a subindex (i_1) of not more than 6;
- **compartment:** a building or part of a building, comprising one or more rooms, spaces or storeys, constructed to prevent the spread of fire to or from another part of the same building, or an adjoining building;
- **compartment floor:** a fire-resisting floor used to separate one fire compartment from another and having a minimum period of resistance of 60 minutes;
- **compartment wall:** a fire-resisting wall used to separate one fire compartment from another and having a minimum period of resistance of 60 minutes (or 30 minutes in single-storey hospitals);
- **emergency lighting:** lighting provided for use when the power supply to the normal lighting fails;
- **escape lighting:** that part of the emergency lighting which is provided to ensure the escape routes are illuminated at all material times;
- **final exit:** the termination of an escape route from a building giving direct access to a place of safety outside the building;
- **fire door:** a door or shutter provided for the passage of persons, air or objects which, together with its frame and furniture as installed in a building, is intended when closed, to resist the passage of fire and/or gaseous products of combustion and is capable of meeting specified performance criteria to those ends;
- **fire hazard room:** a room or other area which, because of its function and/or contents, presents a greater hazard of fire occurring and developing than elsewhere;

- **fire hazard:** a set of conditions in the operation of a product or system with the potential for initiating a fire;
- **fire resistance:** the ability of an element of building construction, component or structure to fulfil, for a stated period of time, the required load-bearing capacity, fire integrity and/or thermal insulation and/or other expected duty in a standard fire resistance test;
- **fire stop:** a seal provided to close an imperfection of fit or design tolerance between elements or components, to restrict the passage of fire and smoke;
- **height of a hospital:** the distance from ground level at the lowest side of the building measured to the surface of the top floor, other than a top floor or floors used exclusively for building services;
- **material of limited combustibility:** either:
  - (i) a non-combustible material; or
  - (ii) any material of density 300 kg/m^3 or more which, when tested in accordance with BS476: Part 11, does not flame, and whose rise in temperature on the furnace thermocouple is not more than 20°C; or
  - (iii) any material with a non-combustible core of 8 mm thickness or more, having combustible facings (on one or both sides) not more than 0.5 mm thick; or
  - (iv) any material of density less than 300 kg/m^3 which, when tested in accordance with BS476: Part 11, does not flame for more than 10 seconds and whose rise in temperature is not more than 35°C on the centre (specimen) thermocouple and not more than 25°C on the furnace thermocouple;
- **non-combustible:** any material which is capable of satisfying the performance requirements specified in BS476: Part 4, or any material which when tested in accordance with BS476: Part 11 does not flame or cause any rise in temperature on either the centre (specimen) or furnace thermocouple;
- **patient access areas:** those areas of the hospital to which patients have reasonable access either with or without supervision;
- **place of safety:** a place where persons are in no danger from fire;
- **progressive horizontal evacuation:** evacuation of patients away from a fire into a fire-free compartment or sub-compartment on the same level;
- **protected shaft:** a shaft which enables persons, air or objects to pass from one compartment to another, and which is enclosed with fire-resisting construction;
- **relevant boundary:**
  - (i) the actual boundary of the premises; or
  - (ii) the boundary of the site which the side of the building faces, and which is parallel, or at an angle of not more than 80° to the side of the building;
  - (iii) the centre line of a road, railway, river or canal which adjoins the actual boundary;
  - (iv) a notional boundary established between buildings, if two or more buildings share the same site;

- **refuge:** a place of temporary safety within a building. This may be an adjoining compartment or sub-compartment capable of holding all those threatened, without a significant change in level and from which there is potential for further escape should that become necessary;
- **sub-compartments:** areas into which the building can be divided to reduce travel distance and which provide 30 minutes' resistance to fire;
- **sub-compartment wall:** a fire-resisting wall used to separate one sub-compartment from another and having a minimum period of resistance of 30 minutes;
- **travel distance:** the horizontal distance to be travelled by a person from any point within the floor area to the nearest adjoining compartment, sub-compartment, escape stairway or external exit, having regard to the layout of walls, partitions, fittings and furniture;
- **unprotected area:** in relation to a side or external wall of building, this means:
  - (i) a window, door or other opening; and
  - (ii) any part of an external wall which has a period of fire resistance less than that required for the elements of structure (integrity and loadbearing capacity only), and which provides less than 15 minutes' fire resistance (insulation); and
  - (iii) any part of the external wall which has combustible material more than 1 mm thick attached or applied to its external face, whether for cladding or any other purpose. (Combustible material in this context is a material which is neither "non-combustible" nor a "material of limited combustibility".)

3.0 Principles of life safety

Introduction

3.1 In hospitals, particularly in patient access areas, the immediate and total evacuation of the building in the event of fire may not be possible or desirable. Patients with restricted mobility, patients who use wheelchairs, and bedbound patients cannot negotiate escape routes, particularly stairways, unaided. Patients under medication may require staff assistance, and patients who are dependent on electrical/mechanical equipment for their survival cannot always be disconnected and moved rapidly without serious consequences.

3.2 This document has been prepared on the assumption that there are sufficient and adequately trained staff on duty in a hospital to provide assistance with any necessary evacuation in the event of fire. However, despite this, the evacuation of an entire hospital in the event of fire would be an enormous exercise in which patients might be placed at risk due to trauma or their medical condition. Should evacuation become necessary it should be based on the concept of progressive horizontal evacuation, with only those people directly at risk from the effects of fire being moved.

Progressive horizontal evacuation

3.3 The principle of progressive horizontal evacuation is that of moving patients from an area affected by fire through a fire-resisting barrier to an adjoining area on the same level, designed to protect the occupants from the immediate dangers of fire and smoke (a refuge). The patients may remain there until the fire is dealt with, or await further evacuation to another similar adjoining area or down the nearest stairway. This procedure should give sufficient time for non-ambulant and partially ambulant patients to be evacuated down stairways to a place of safety, should it become necessary to evacuate an entire storey.

3.4 Active fire protection systems such as detection systems, warning systems and fire suppression systems may be incorporated into the building so that the time available for escape is maximised. This feature may be most beneficial for the occupants of adjacent spaces rather than those in the space immediately affected by the fire.

Requirement

3.5 Every storey containing patient access areas within a hospital should be designed to provide for progressive horizontal evacuation.

3.6 Patient areas to which non-ambulant and partially ambulant patients have access should not be located on storeys where evacuation in a fire emergency would necessitate travelling up a stairway to a final exit.

Chapter 5.0 provides additional guidance on progressive horizontal evacuation.
In certain hospitals where patients are able to escape without assistance, other escape strategies may be acceptable

Separation of patient access areas from other parts of the hospital

3.7 In addition to the requirement for progressive horizontal evacuation, hospitals should also be designed to minimise the possibility of fires from the non-patient access areas affecting the patient access areas of hospitals.

Hospitals by their very nature contain people who are at greater risk from fire than in other buildings. The term "normal dependency" in this document relates to the occupancy profile of patient access areas of hospitals and not to the general population

The classification "normal dependency" also includes "high dependency" as defined in HTM 85 – 'Fire precautions in existing hospitals'

3.8 For the purposes of this document only, patient access areas are categorised, in relation to dependency, as follows:

a. normal dependency: all patients except those classified as "very high" dependency;

b. very high dependency: those whose clinical treatment and/or condition creates a high dependency on staff; for example, those in intensive therapy units, special care baby units, and operating departments.

Hazard departments are listed in Table 1

3.9 Non-patient access areas, for the purposes of this document only, are divided into:

a. hazard departments: departments/management units which contain high fire loads and/or significant ignition sources. Hazard departments should preferably be separated by distance from any patient access areas and should not adjoin them, either horizontally or vertically, unless additional precautions are provided;

b. non-hazard departments: departments/management units which do not contain high fire load and/or significant ignition sources. Non-hazard departments may adjoin patient access areas, either horizontally or vertically, provided they are separated from them by compartment walls and floors.

Requirement

3.10 Patient access areas should always be in different compartments from non-patient access areas.

3.11 Departments/management units should be located in accordance with Table 1.

Staffing levels

3.12 The provision of an adequate number of staff who have received effective fire safety training is the best first-line defence against fire. This is particularly important at night when levels of activity in the hospital are reduced. The presence of trained staff who can respond quickly and effectively to any fire emergency is a vital factor in limiting the consequences of a fire, particularly where dependent patients are involved.

3.13 The guidance in this document has been prepared on the understanding that adequate numbers of staff will always be available. It is the responsibility of management to ensure that this is so and devise suitable arrangements to provide for the safe evacuation of patients, in accordance with the emergency evacuation plan.

Requirement

3.14 When the department/management unit is in use, there should be a minimum of two staff present at all times. These staff should have received training in the methods of patient evacuation appropriate to the dependency of the patients and be familiar with the evacuation procedures at their place of work.

3.15 Where the number of patients in the department/management unit is above 30, the minimum number of staff present at all times should be increased to three.

This is an operational requirement and cannot be enforced through the current Building Regulations

Table 1 Recommendations for the location and fire separation of fire hazard departments in relation to patient access areas

	Patient access area	
Hazard department	Normal dependency	Very high dependency
Atrium	See FPN 8	
Boilerhouse	60 + auto-suppression	–
Central staff change	60	60 + auto-suppression
Central stores	60 + auto-suppression	–
Commercial enterprises	See FPN 5	
Central Sterile Supplies or Hospital Sterilizing and Disinfecting Unit	60	60 + auto-suppression
Flammable store	60 + auto-suppression	–
Health records	60	60 + auto-suppression
Laundry	60 + auto-suppression	–
Main electrical switchgear	60 + auto-suppression	–
Main kitchens	60 + auto-suppression	–
Main stores	60 + auto-suppression	–
Medical gas stores*	60 + auto-suppression	–
Pathology	60	60 + auto-suppression
Pharmaceutical (manufacturing)	60	60 + auto-suppression
Refuse collection/ incineration	60 + auto-suppression	–
Works	60 + auto-suppression	–

Key
60 – May be adjacent but should always be separated by 60 minute fire-resisting construction. 60 minutes fire resistance may be reduced under certain circumstances; if sprinklers are fitted see paragraphs 5.6 and 5.8.
60 + auto-suppression – Preferably separate; however, if adjacent should be separated by 60 minute imperforate construction ***together*** *with auto-suppression in the hazard department. The imperforate construction should comply with the guidance in paragraphs 6.63 to 6.76.*
– should not be located adjacent to very high dependency departments.

* Note: Medical gas stores should always be located in separate buildings. HTM 2022 – 'Medical gas pipeline systems' gives guidance

4.0 Communications

Principle

4.1 The design and construction of the building should ensure that fires are detected at the earliest possible opportunity and that suitable warning is then given to the occupants and the emergency services.

4.2 The provision of adequate means for detecting a fire and raising the alarm is of vital importance. Early detection permits time for orderly evacuation and allows the fire to be tackled at an earlier stage, thus minimising the damage caused. Detection is dependent on staff observation and the automatic alarm and detection systems. Firecode: HTM 82 – 'Alarm and detection systems' gives guidance on the design of new systems and the renewal and upgrading of existing alarm and detection systems in hospitals.

Observation

4.3 The early detection of fire by people is probably the best form of detection, and the design and layout of an area can make a positive contribution to fire safety. Within a patient access area the most important aspect is the number of beds visible from the staff base, which is the base from which all staff work and where information is stored and exchanged. Although it is unlikely that the staff base will be permanently staffed, a location which provides good observation will improve the likelihood of a fire being detected at an early stage.

Alarm and detection systems

4.4 The provision of effective fire alarm systems in hospitals is a vital component of the overall fire safety strategy to protect patients, staff and property from fire. Firecode: HTM 82 – 'Alarm and detection systems' provides general principles and technical guidance on the design, specification, installation, commissioning, testing, operation and maintenance of fire alarm systems in hospitals. It should be read in conjunction with BS5839: Part 1: 1988 – 'Fire detection and alarm systems for buildings: Code of practice for system design, installation and servicing'.

Requirement

4.2 Alarm and detection systems should be designed in accordance with the guidance in Firecode: HTM 82 – 'Alarm and detection systems', 1996 edition.

5.0 Means of escape

Principle

5.1 The design and construction of the hospital should ensure that, at all material times, patients, visitors and staff can move away from a fire to a place of temporary safety inside the hospital on the same level, from where further escape is possible to a place of safety outside the building.

5.2 This section provides guidance on means of escape by reference to:

a. the potential for horizontal evacuation, which is achieved by dividing the storey into compartments and sub-compartments;

b. the height above ground of the treatment area;

c. travel distances and escape routes;

d. the provision of an adequate number of stairways to facilitate vertical escape;

e. emergency and escape lighting.

Progressive horizontal evacuation

5.3 The need for progressive horizontal evacuation in patient access areas of hospitals is discussed in Chapter 3. This principle will be met if the requirements below are achieved.

Requirement

Storeys up to 12 metres above ground level with a floor area of less than 1000 m²

5.4 Every storey with a floor area of less than 1000 m² and which contains patient access areas should:

a. contain no more than 30 patients;

b. be divided into a minimum of two compartments.

5.5 Where a compartment provides sleeping accommodation, the maximum number of beds in the compartment should be no more than 20.

5.6 In storeys above ground floor level, where sprinklers are installed, the fire-resistance of the compartment walls required by 5.4(b) above may be reduced to 30 minutes (integrity and insulation).

Storeys up to 12 metres above ground level with a floor area of more than 1000 m²

5.7 Every storey up to 12 metres above ground, which has a floor area of more than 1000 m², and which contains patient access areas, should be divided into a minimum of three compartments. One of these compartments may be a hospital street (see paragraphs 5.38 to 5.44 below).

5.8 In storeys above ground floor level, where sprinklers are installed, the fire resistance of the compartment walls required by 5.7 above may be reduced to 30 minutes (integrity and insulation).

Storeys over 12 metres above ground level

5.9 Every storey over 12 metres above ground, which contains patient access areas, should be divided into a minimum of four compartments. Where no hospital street is provided, each compartment should have a minimum floor area of 500 m²; where one of the compartments is a hospital street, the area of the hospital street may be less than 500 m².

5.10 Where sprinklers are installed, the minimum floor area of each compartment required by 5.9 above may be reduced to 350 m².

General

5.11 In a fire emergency each compartment should be capable of accommodating, as well as its normal occupants, the designed occupancy of the most highly occupied adjoining compartment.

Exits from compartment

5.12 Exits from compartments should be by way of circulation space only and provided in accordance with the guidance in Figure 1.

5.13 From ward bedrooms only it is acceptable to directly escape to:

a. an adjacent ward bedroom in an adjoining compartment or sub-compartment; or

b. a circulation space in an adjoining compartment or sub-compartment.

See Figure 2.

It is not possible to give precise recommendations on the location of alternative exits; the aim should be locate these as far apart as practical and if possible in opposite walls. In a fire situation at least one exit should always be available

5.14 Where a storey is divided into three or more compartments, the exits from each compartment should be located so that there are at least two alternative exits which provide horizontal escape to adjoining but separate compartments.

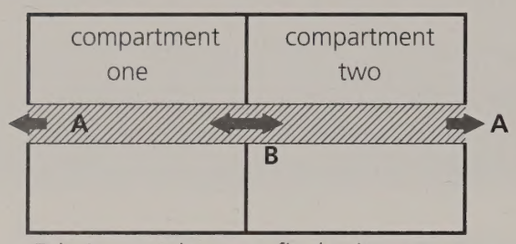
5.15 The above requirements do not preclude the use of escape routes across flat roofs. Figure 3 shows the limited circumstances where these are permitted.

Figure 1 Requirements for progressive horizontal evacuation (Paragraphs 5.4 to 5.18)

Key

circulation space

i. Storeys up to 12 metres above ground with a floor area of less than 1000 m² minimum of two exits required as indicated below

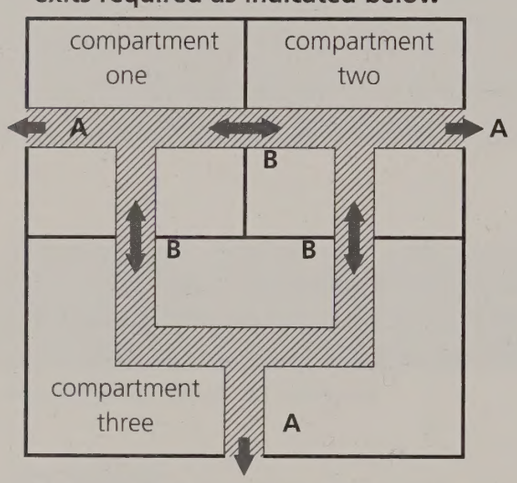


Maximum of 30 patients on each storey

Where compartment provides sleeping accommodation – maximum of 20 beds in each compartment

Exit A – a stairway or final exit
Exit B – to the adjoining compartment

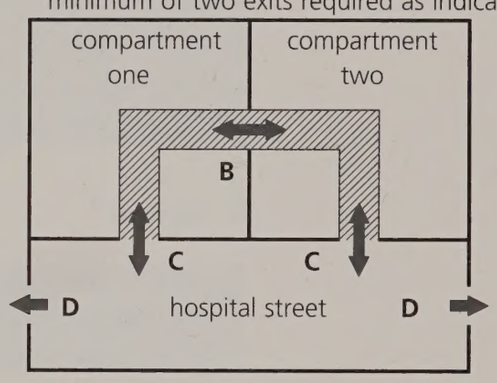
ii. Storeys up to 12 metres above ground with a floor area of more than 1000 m² minimum of three exits required as indicated below



Exit A – a stairway or final exit
Exit B – to an adjoining compartment

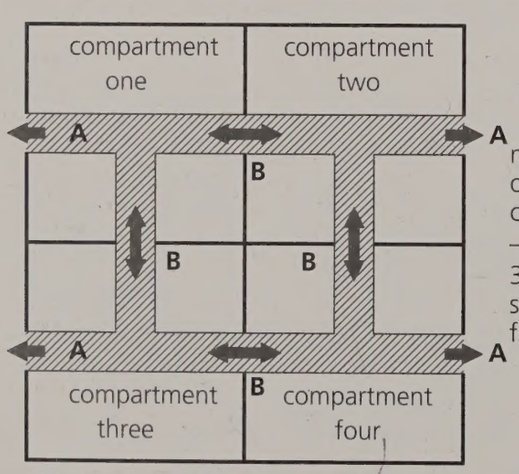
OR

minimum of two exits required as indicated below



Exit B – to an adjoining compartment
Exit C – to the hospital street
Exit D – a stairway or final exit

iii. Storeys over 12 metres above ground; minimum of three exits required as indicated below

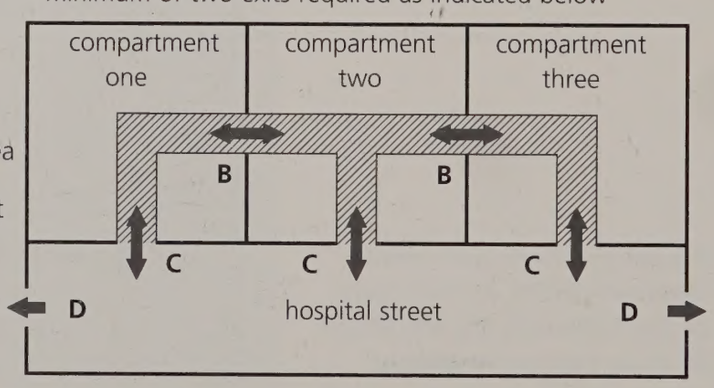


Exit A – a stairway
Exit B – to an adjoining compartment

OR

minimum area of each compartment – 500 m² or 350 m² if sprinklers are fitted

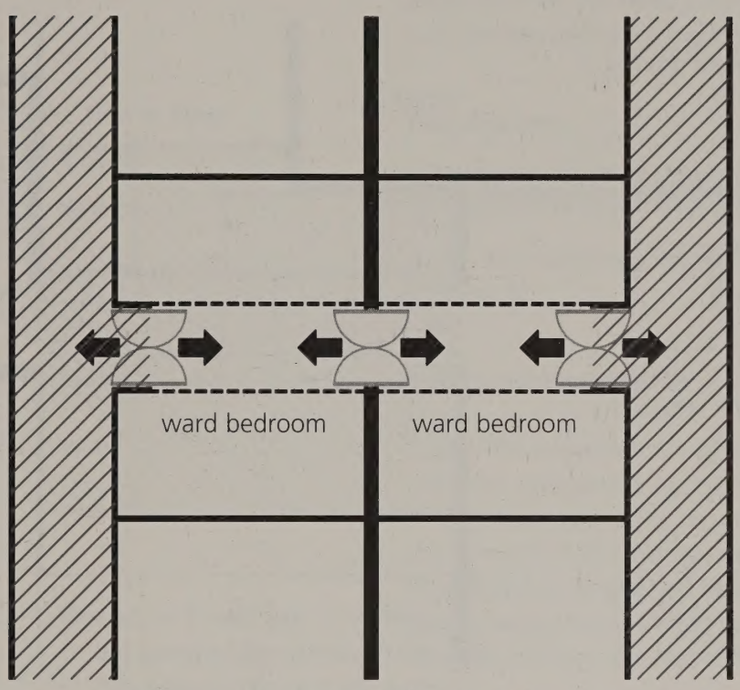
minimum of two exits required as indicated below



area of hospital street may be less than 500 m²

Exit B – to an adjoining compartment
Exit C – to the hospital street
Exit D – a stairway

Figure 2 Escape from ward bedrooms
(Paragraph 5.14)

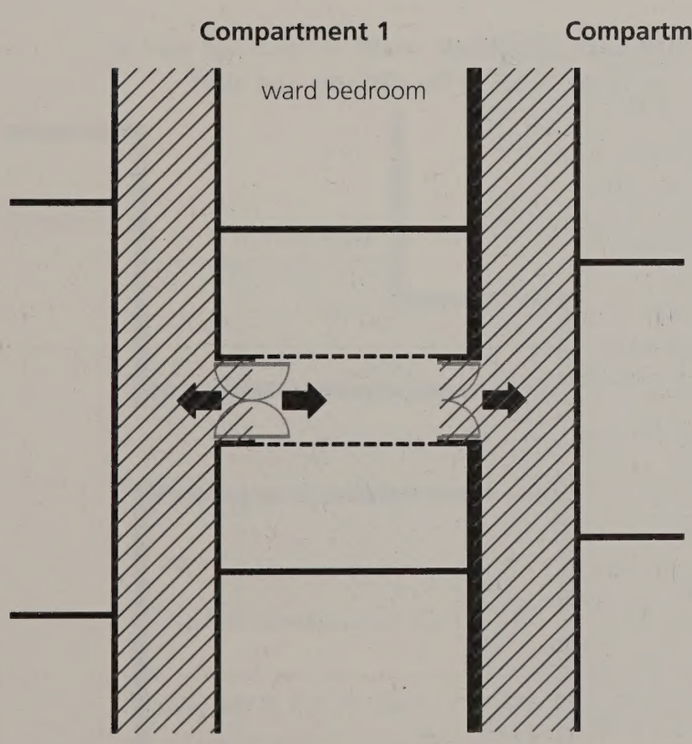


Notes:

i. the escape door in the compartment wall should be available for use at all times and should never be locked;

ii. the bedroom door and the escape door should be opposite each other and the route between them kept clear;

iii. escape should be from circulation space through one ward bedroom only, through the compartment wall then through one ward bedroom only to the circulation space.



Note:

i. in this instance escape from the circulation space in compartment 2 should not be via the ward bedroom into compartment 1

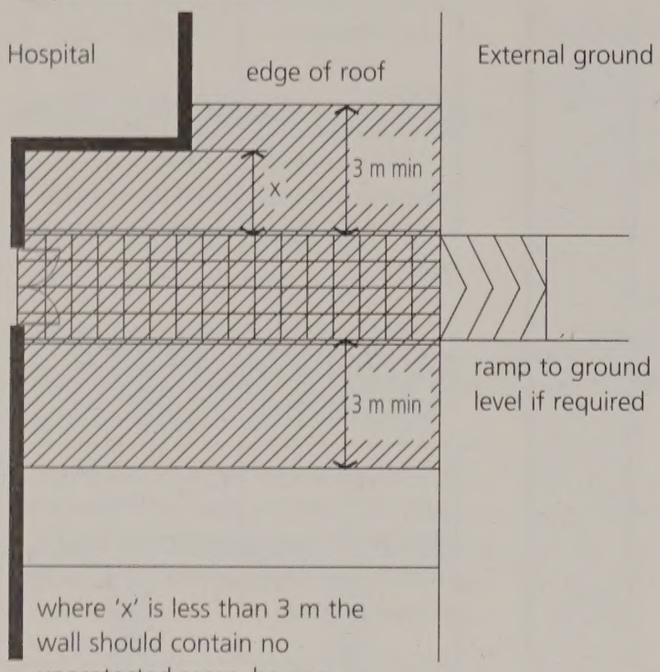
Key

circulation space

Figure 3 Permissible escape routes across flat roofs (Paragraph 5.15)

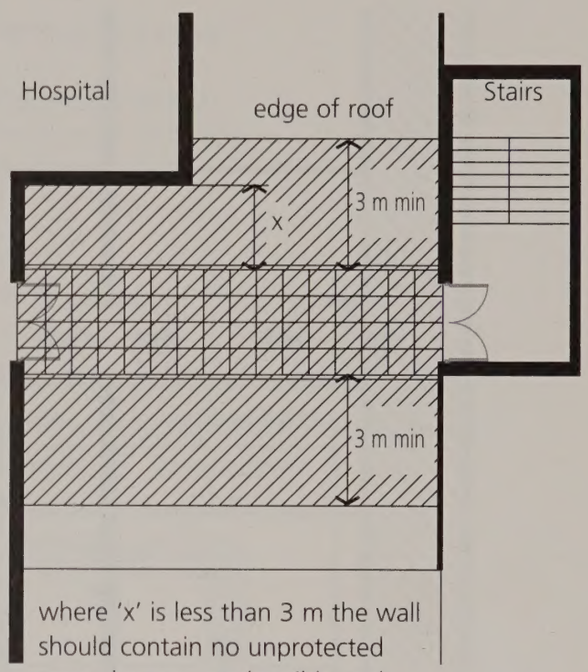
Note: hatched area of roof to be constructed as an element of structure

i. Escape route across a flat roof to external ground for patients and staff



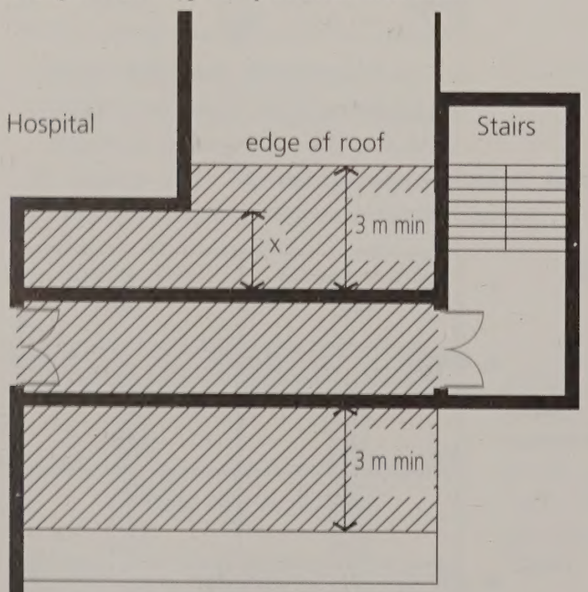
where 'x' is less than 3 m the wall should contain no unprotected areas, be non-combustible and contain no extract ducts.

ii. Escape route across a flat roof for staff only



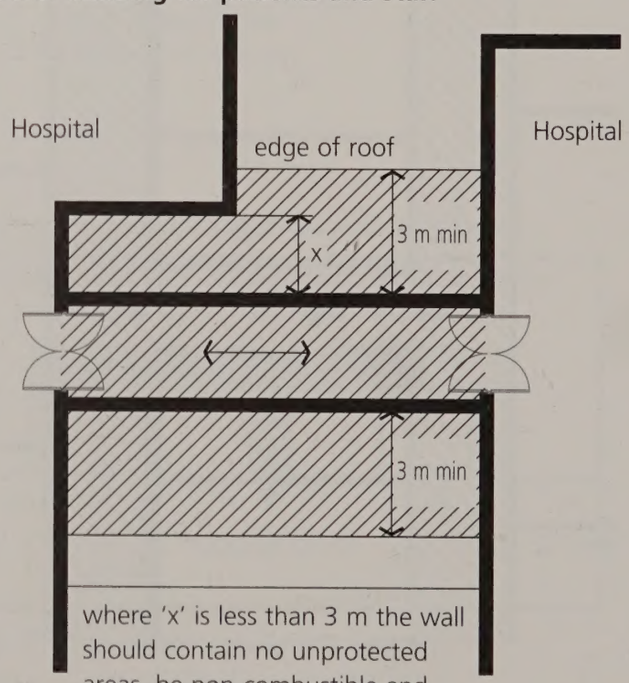
where 'x' is less than 3 m the wall should contain no unprotected areas, be non-combustible and contain no extract ducts.

iii. Enclosed escape route across a flat roof to an escape stairway for patients and staff



where 'x' is less than 3 m the wall should contain no unprotected areas, be non-combustible and contain no extract ducts.

iv. Enclosed escape route across a flat roof to another building for patients and staff



where 'x' is less than 3 m the wall should contain no unprotected areas, be non-combustible and contain no extract ducts.

Note: the travel distance across the flat roof is included in the measurement of travel distance.

Compartment/department relationships

5.16 The provision of compartments to facilitate progressive horizontal evacuation should not be looked upon only in terms of means of escape. The management responsibilities, such as the extent of the area under their control, the day-to-day management, fire drills, the management of evacuation etc will have a significant impact on the design, integrity, size and configuration of compartments.

Requirement

5.17 The boundaries of departments should be compartment walls.

5.18 Additional requirements for compartmentation are provided in Chapter 6.

Sub-compartmentation

5.19 The maximum size of compartment permitted by this document, although appropriate for fire containment (see paragraph 6.7 below), is nevertheless considered too large if the area contains patient access areas. In the event of fire a large number of patients could be overcome by the spread of fire, smoke and toxic gases. Therefore, compartments containing patient access areas should be divided into smaller sub-compartments to limit the number of patients who may be affected by a fire.

Requirement

5.20 A compartment should be sub-compartmented if either:

a. it has a floor area greater than 750 m^2;

b. it contains departments to which more than 30 patients will have access at the same time;

c. it contains sleeping accommodation for more than 30 patients.

5.21 Sub-compartments should be enclosed by walls having a minimum period of fire resistance of 30 minutes, which should terminate at the underside of either:

a. a compartment floor; or

b. a roof; or

c. a ceiling which is non-demountable and imperforate and has a minimum period of fire resistance of 30 minutes, when tested from below in accordance with BS476: Parts 20 and 22.

5.22 All openings in sub-compartment walls should be protected to provide a minimum period of fire resistance of 30 minutes.

Exits from sub-compartments

5.23 Each sub-compartment should be provided with a minimum of two exits by way of circulation spaces (or from ward bedroom to ward bedroom) to adjoining but separate compartments or sub-compartments.

5.24 The solution illustrated in Figure 4 is not acceptable and should be avoided.

Openings in sub-compartment walls for ductwork

5.25 Ductwork passing through sub-compartment walls need not be provided with automatic fire shutters provided that:

a. the duct serves only one sub-compartment; and

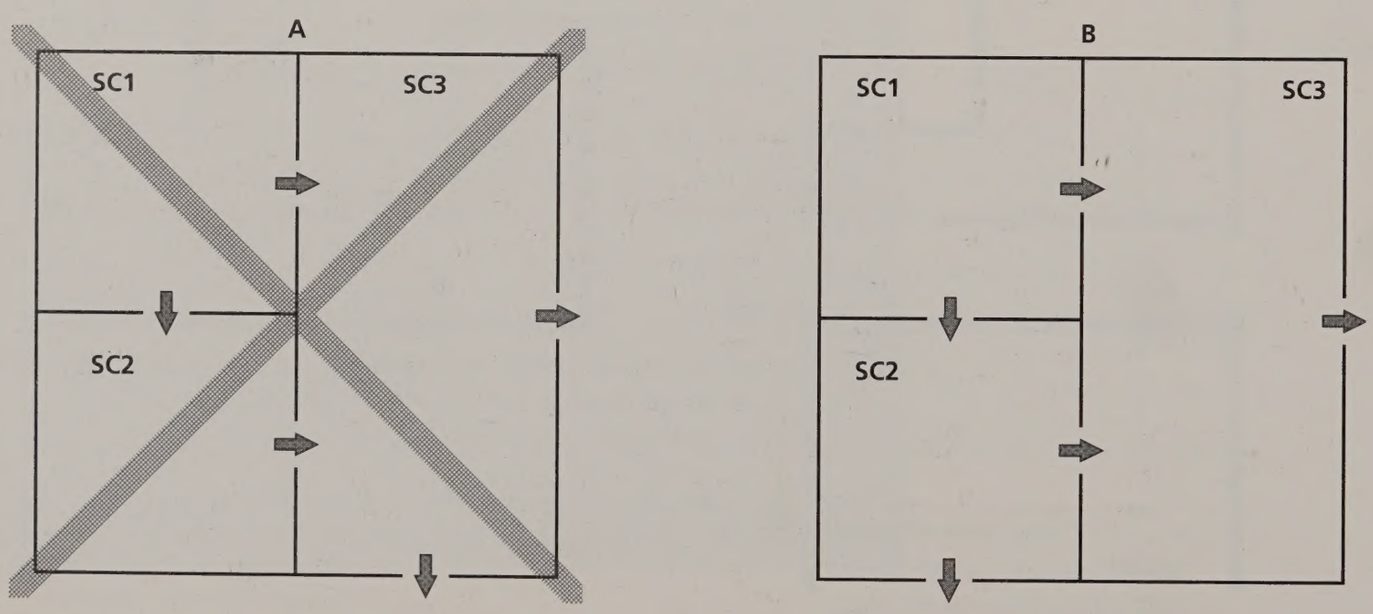
b. the ductwork and supports have a minimum period of fire resistance of 30 minutes (integrity only) when tested in accordance with the relevant parts of BS476.

See Figure 14.

Transfer grilles

5.26 To reduce the possibility of smoke transfer between sub-compartments, transfer grilles should not be provided in sub-compartment walls.

Figure 4 Exits from sub-compartments



The sub-compartmentation in example A is unacceptable since a fire in SC3 would block the exit from SC1 and SC2.

The sub-compartmentation in example B is acceptable since a fire in any one sub-compartment would not block the safe exit from others.

Glazing in sub-compartment walls

5.27 Uninsulated fire-resisting glazed screens may only be provided in sub-compartment walls provided they satisfy the following requirements:

a. the glazing should provide a minimum period of 30 minutes fire resistance (integrity only);

b. the area of glazing should be limited to a maximum of 1 m^2 in any one room.

5.28 There is no limit on the use of glazed screens which provide a minimum period of fire resistance of 30 minutes (integrity and insulation).

5.29 Where sprinklers are fitted there is no limit on the use of glazed screens which provide a minimum period of fire resistance of 30 minutes (integrity only).

Travel distances

5.30 The distance to adjacent compartments, hospital streets, sub-compartments, stairways and final exits should be limited to ensure that the occupants can escape from the effects of a fire within a reasonable period of time.

Requirement

Single direction of escape

5.31 The maximum travel distance before there is a choice of escape routes should be no more than 15 metres.

5.32 Any part of an enclosed escape route which has single direction of escape only, should be protected by 30 minute fire resisting construction. See Figure 5.

5.33 Only glazing which provides a minimum period of fire resistance of 30 minutes (integrity and insulation) may be provided on circulation spaces giving a single direction of escape. Where a sprinkler system is installed there is no requirement for insulation.

5.34 Escape from an inner room via an access room is permitted provided the access room is not a fire hazard room.

Total travel distance

Requirement

5.35 The maximum travel distance within a compartment should be no more than 60 metres to:

a. each of two adjoining compartments; or

b. an adjoining compartment and to a stairway or final exit.

See Figure 6.

Figure 5 Single direction of escape
(Paragraphs 5.31 to 5.34)

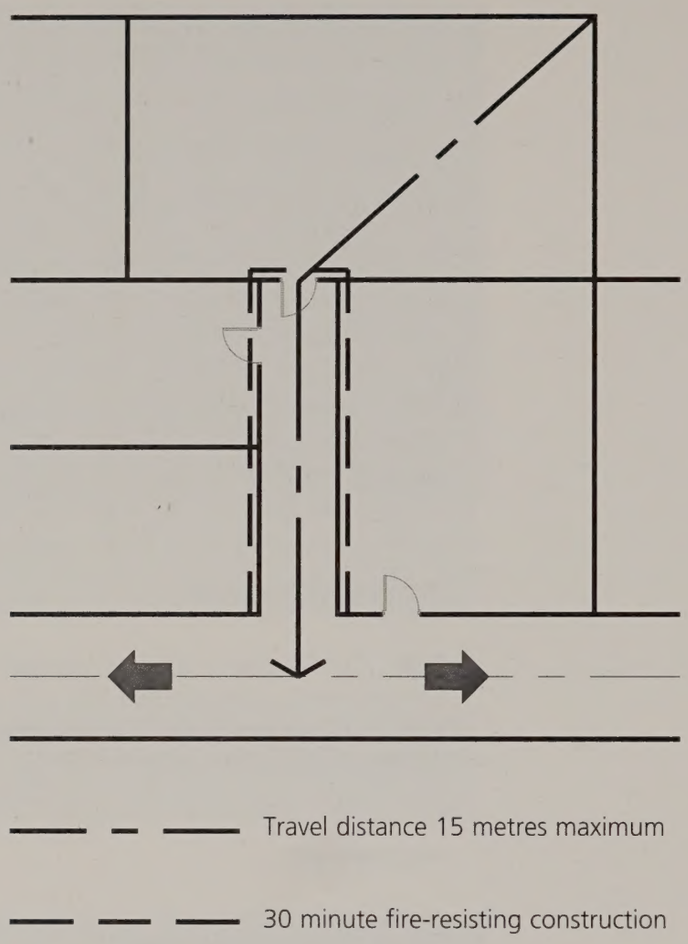
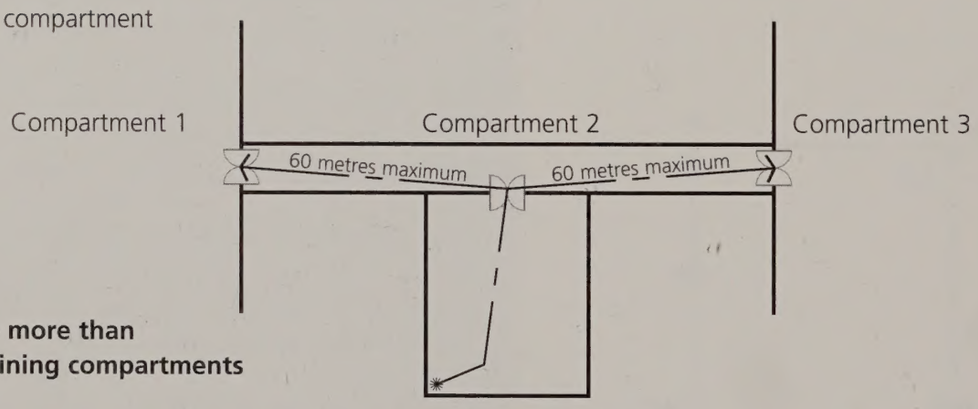
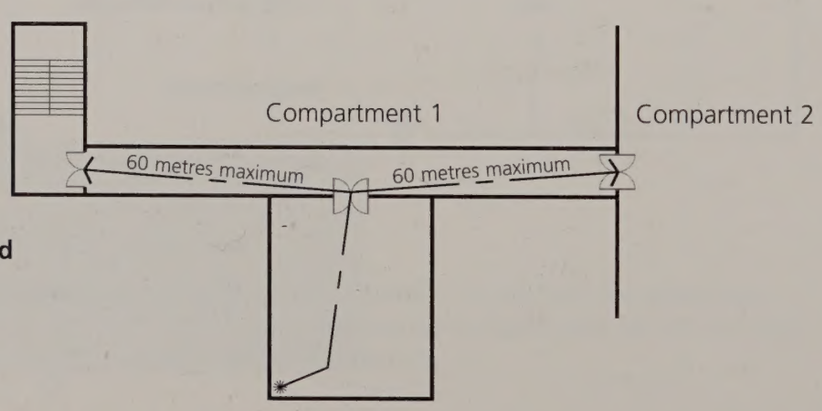


Figure 6 Travel distance within a compartment
(Paragraph 5.35)



i. Maximum travel distance no more than 60 metres to each of two adjoining compartments

OR



ii. Maximum travel distance no more than 60 metres to an adjoining compartment and to a stairway

5.36 The maximum travel distance from any point within a sub-compartment should be no more than 30 metres to:

a. an adjoining compartment or sub-compartment;

b. a stairway or final exit.

See Figure 7.

5.37 Single direction escape travel distance is an element of maximum travel distance.

Hospital streets

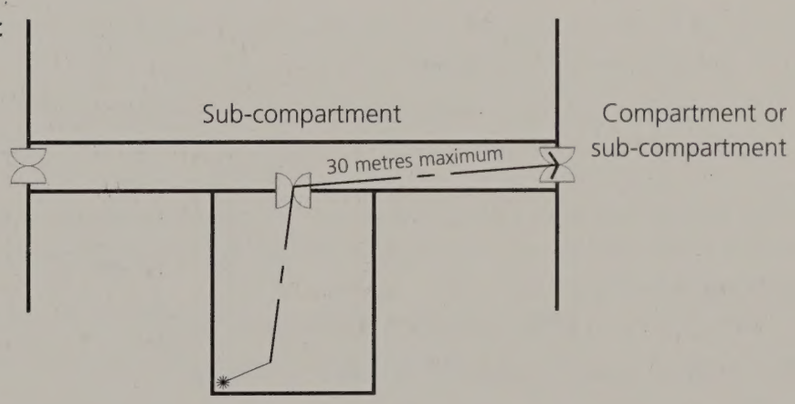
5.38 In the design of hospitals, the concept of the hospital street as the main communication route is widely used. The hospital street provides an essential link between hospital departments and stairways and lifts; it is the main circulation route for staff, patients and visitors. Although many hospitals will be provided with hospital streets, they are not an essential requirement.

5.39 A hospital street is a special type of compartment which connects final exits, stairway enclosures and department entrances. It has two functions from a fire safety aspect:

a. it will serve the fire brigade as a fire-fighting bridgehead; and

b. if the spread of fire within a department cannot be brought under control, the occupants of the department affected may be evacuated via the hospital street to parts of the hospital not affected by the fire.

i. Maximum travel distance no more than 30 metres to an adjoining compartment or sub-compartment



OR

ii. Maximum travel distance no more than 30 metres to a stairway or final exit

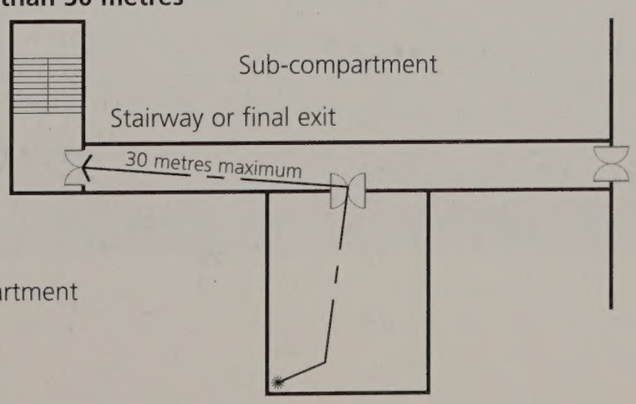


Figure 7 Travel distance within a sub-compartment (Paragraph 5.36)

Requirement

5.40 A hospital street should:

a. be constructed to the same fire-resisting standards as a fire compartment;

b. have a minimum clear width of 3 metres;

c. be divided into a minimum of three sub-compartments, each with a maximum length of 30 metres;

d. at ground floor have a minimum of two final exits located:

   (i) at every extremity of the hospital street;

   (ii) so that the maximum travel distance between final exits is no more than 180 metres measured along the length of hospital street;

   (iii) so that the maximum distance from a compartment exit to a final exit is no more than 90 metres;

e. at upper levels, have access to a minimum of two stairways each in separate sub-compartments, which are located so that:

   (i) the maximum distance between stairways does not exceed 60 metres;

   (ii) the maximum single direction of travel within the street does not exceed 15 metres;

   (iii) the maximum distance from a compartment exit to a stairway is no more than 30 metres;

f. contain no other accommodation except sanitary accommodation.

See Figures 8 and 9.

5.41 Entrances from the hospital street to adjoining compartments should:

a. not be located in the same street sub-compartment as entrances to stairways and lift enclosures;

b. be located so that an alternative means of escape from each compartment is always possible, see Figure 9.

5.42 All stairways should be located so that the maximum travel distance from the exit from the stairway enclosure to the final exit of the hospital street is no more than 60 metres.

Fire brigade access to hospital streets

5.43 A minimum of two stairways should terminate within 15 metres of a final exit which itself is within 18 metres of a suitable fire brigade access point (see also paragraphs 7.7 to 7.29).

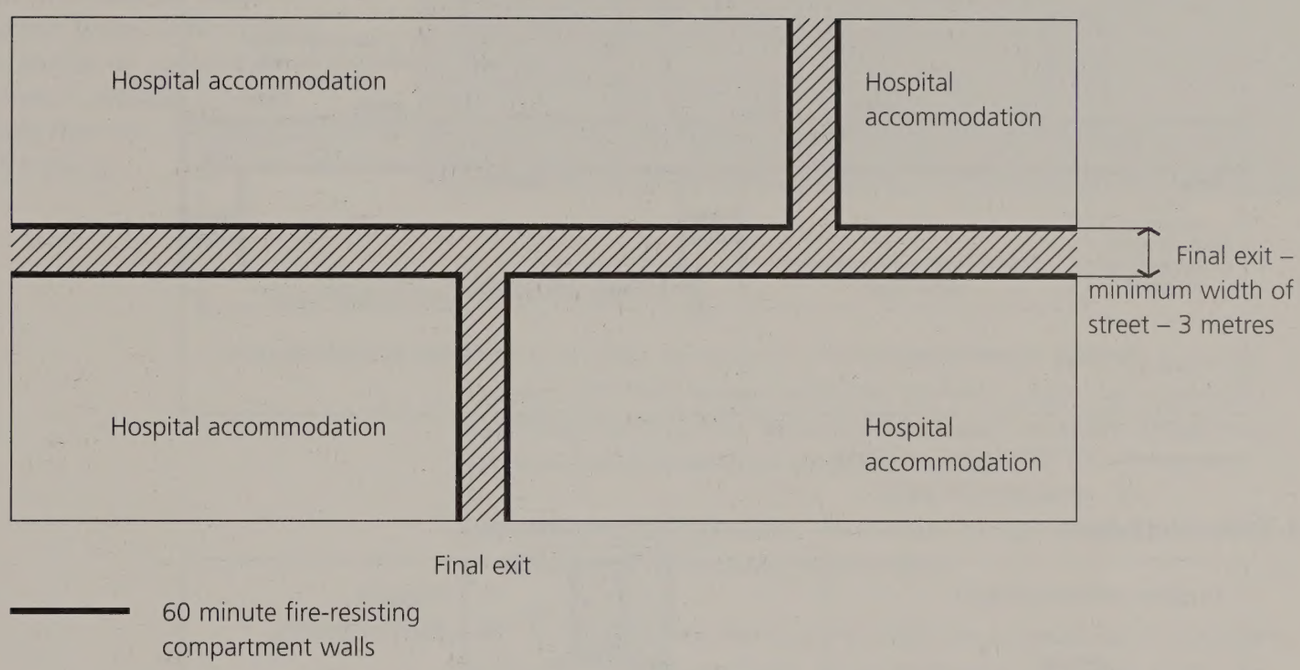
Additional requirements for hospital streets with only three sub-compartments

5.44 On upper storeys stairways should be provided in two of the three sub-compartments and the third sub-compartment should be capable of accommodating all the occupants of the largest adjoining compartment.

Figure 8 Ground floor hospital streets
(Paragraphs 5.38 to 5.44)

i. Basic design

Minimum width of street 3 metres
Final exit at every extremity



ii. Basic sub-division

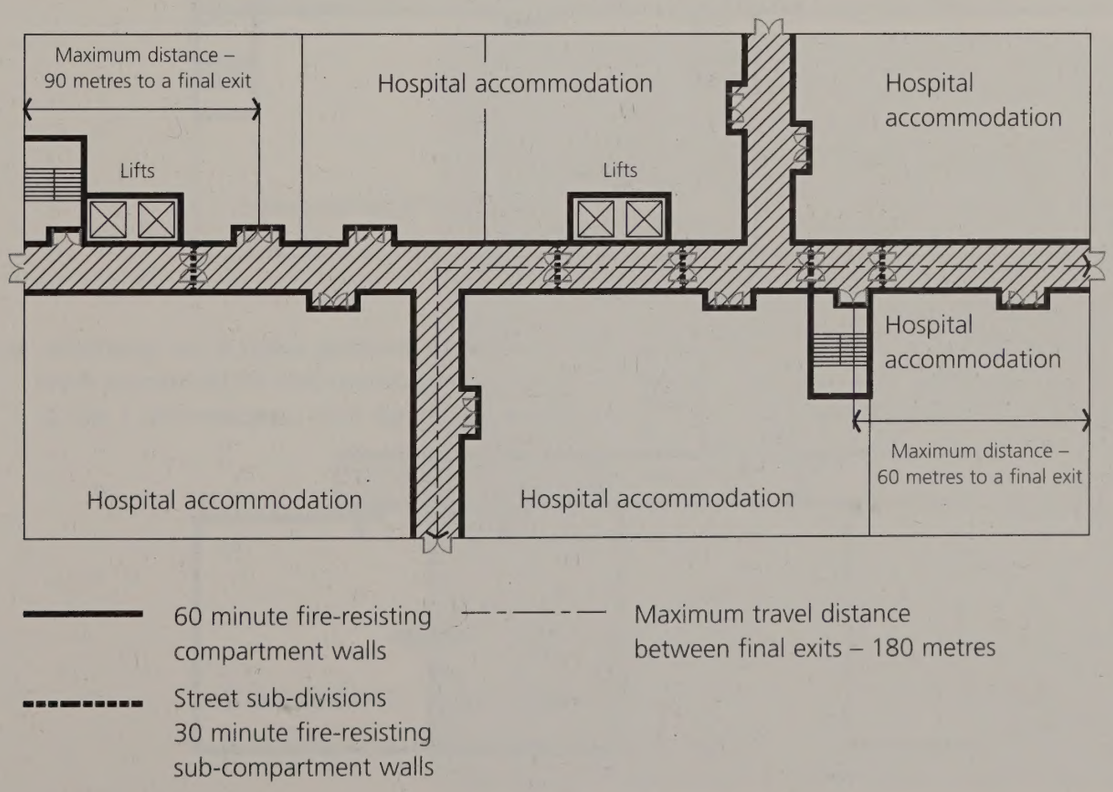
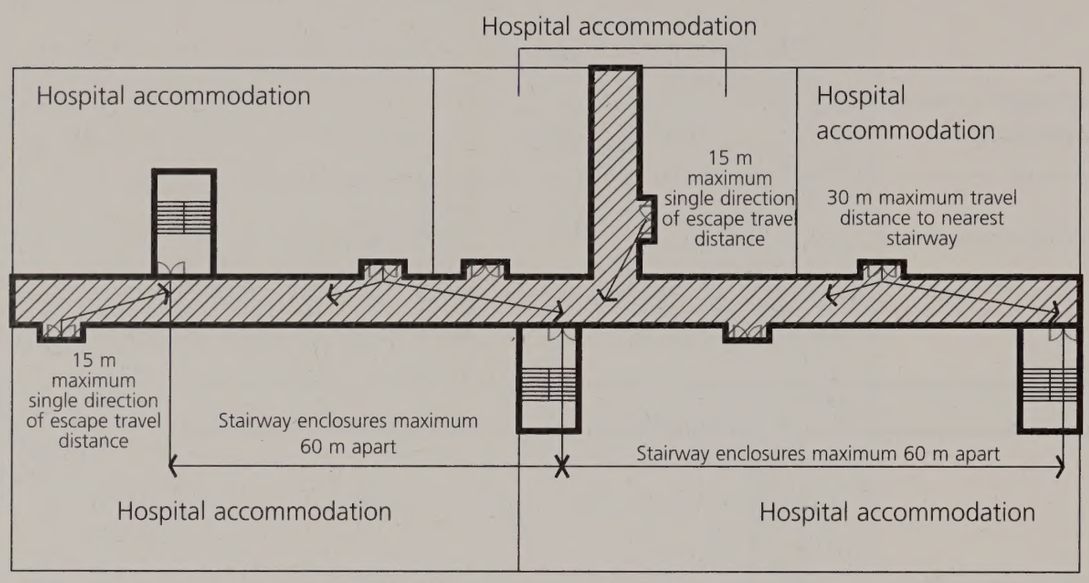


Figure 9 Hospital streets on upper floors
(Paragraphs 5.38 to 5.44)

Key

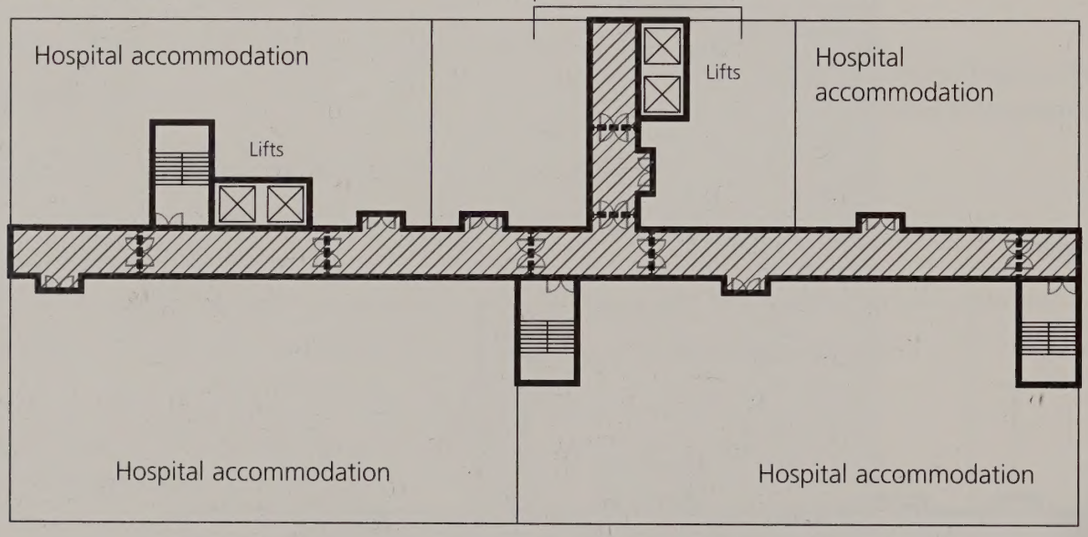
Hospital street

i. Basic design



60 minute fire-resisting compartment walls

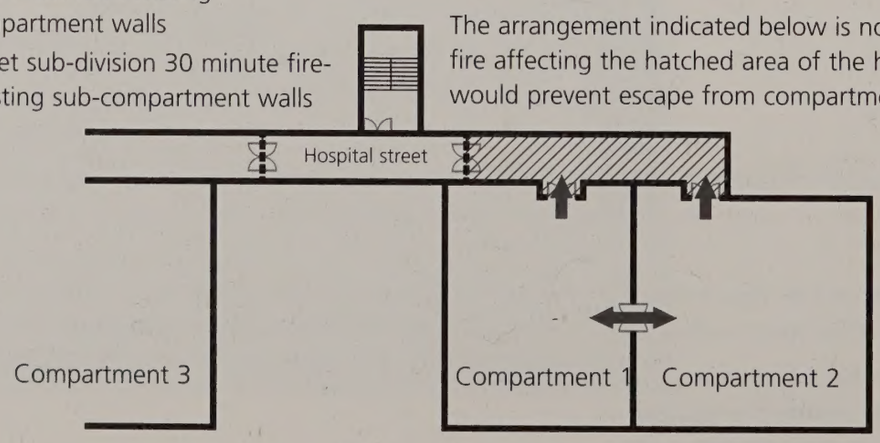
ii. Basic sub-division



60 minute fire-resisting compartment walls

Street sub-division 30 minute fire-resisting sub-compartment walls

The arrangement indicated below is not acceptable, as a fire affecting the hatched area of the hospital street would prevent escape from compartments 1 and 2



Width of escape routes

5.45 Generally within departments where beds and patient trolleys are being moved, the width of the circulation spaces required for these activities should be adequate for escape purposes. However, elsewhere the width of escape routes should be determined by the number of people who would normally be expected to use them in an emergency.

Requirement

Guidance on suitable widths of circulation routes within hospital departments, for operational purposes, is available in Health Building Note 40 – 'Common activity spaces'

5.46 In departments and areas where beds or patient trolleys will not be used, the minimum clear width of escape routes should be:

a. for up to 200 people – 1100 mm;

b. for over 200 people – an additional 275 mm for every additional 50 people.

Vertical escape

5.47 In hospitals the practice of designating certain stairways as escape stairways and others as communication stairways only, is not acceptable, since in an emergency any stairway will be used if necessary. Therefore all stairways should be designed as escape stairways.

5.48 The majority of hospitals will normally contain an adequate number of stairways due to functional requirements.

5.49 In hospitals designed to comply with the guidance in this document, the provision of lifts specifically for the evacuation of patients is not considered necessary.

Requirement

5.50 Every hospital should be provided with a minimum of two stairways. Where hospitals are provided with hospital streets the stairways should be located within the hospital street. In hospitals not provided with hospital streets, stairways should be provided to each compartment.

5.51 Stairways should be located so that an alternative means of escape is always available from every compartment and sub-compartment.

5.52 External stairways should not be provided for escape purposes.

Table 3 Provision of stairways

Number of patient beds on any one upper storey	Number of stairways
1 – 100	2
101 – 200	3
201 – 300	4
301 – 400	5

5.53 Stairways should always be remote from each other so that in the event of fire at least one is available for evacuation purposes.

Remoteness is not necessarily governed by distance; it may be achieved by fire-resisting construction

Mattress evacuation

Requirement

5.54 All stairways to areas which provide sleeping accommodation should be designed to permit the evacuation of patients on mattresses (mattress evacuation).

5.55 Table 4 provides guidance on acceptable dimensions.

Table 4 Width of stairways (mm)

Stair width	Minimum landing width	Minimum landing depth
1300	2800	1850
1400	3000	1750
1500	3200	1550
1600	3400	1450
1700	3600	1400
1800	3800	1350

Notes on Table 4:

(i) the table gives various stairway widths and associated landing widths and depths, all of which allow mattress evacuation but vary in their capacity to enable pedestrian passing when the stairway is being used for mattress evacuation;

(ii) the dimensions refer to clear widths between handrails;

(iii) the stair width is not determined by the number of people expected to use the flight in a fire emergency, but on the requirements of mattress manoeuvrability, and as such the guidance in Approved Document K in relation to landing depths need not be applied.

Width of stairways not intended for mattress evacuation

Requirement

5.56 Where stairways are provided to areas not including patient sleeping accommodation, the width of the stairway should be determined from the guidance in paragraph 5.46 above.

All stairways

Requirement

5.57 All stairways should terminate at ground level and:

a. provide access to the outside; or

b. discharge to a route from the base of the stairway to the outside, which provides the same period of fire resistance as the protected shaft and which contains no accommodation, except that permitted for a protected shaft; or

c. discharge to a hospital street.

Additional requirements for stairways

5.58 Additional requirements for the enclosure and ventilation of stairways are provided in paragraphs 6.17 to 6.27 below.

Final exits

5.59 Generally within hospitals, many of the final exits will also be used as everyday access to the hospital and consequently should be designed to permit access for people with restricted mobility. However, there may be some exits provided only for escape purposes.

5.60 The design of all exits should recognise the often conflicting requirements of means of escape and security of the hospital. It is not possible to provide definitive guidance on this issue; however, any solution should be agreed between the enforcing authorities, the hospital management and its security advisers.

Requirement

5.61 Final exit doors should open outwards and should never be provided with locks requiring a key for opening.

5.62 Automatic final exit doors should be freely openable by hand under any condition, including power failure; otherwise, adjacent non-automatic outward opening doors should be provided.

5.63 Final exit doors from patient access areas should not be provided with a step, and should open onto an area which is level for a distance of one metre.

External escape routes

5.64 Should it become necessary to evacuate an entire hospital or part of a hospital, adequate external assembly positions should be available. Suitable positions may be roadways, hard standings or suitably designed parts of the landscaping.

Requirement

5.65 The following points should be considered when designing external escape routes:

a. the location of assembly positions to permit access for ambulances;

b. the provision of adequate artificial lighting;

c. the provision of adequate paved footpaths and dropped kerbs to the assembly points;

d. the gradients of external escape routes;

e. the proximity of external escape routes to the external wall of the hospital.

This is an operational requirement and cannot be enforced through the current Building Regulations

Emergency and escape lighting

5.66 For hospitals the general guidance on emergency lighting contained within BS5266: Part 1: 1988 is supplemented by HTM 2007 – 'Electrical services: supply and distribution', HTM 2011 – 'Emergency electrical services' and the CIBSE guide – 'Lighting guide for hospitals and health buildings' which provide additional guidance on hospital emergency lighting and details of the electrical supply required.

Background

5.67 Irrespective of the requirements for fire safety, within hospitals there is an operational requirement to provide emergency lighting. The HTMs and the CIBSE guide mentioned above provide considerable guidance on the design of emergency electrical services for hospitals. The guidance in this document has been prepared on the understanding that generally, in most of the departments of a hospital, the emergency lighting systems will also provide escape lighting of an adequate standard.

5.68 To enable essential hospital services to be maintained, most hospitals are provided with standby generators which operate when there is a failure of mains electricity. These are designed to provide an emergency electrical supply within 15 seconds of a mains failure. In those areas of the hospital where a 15 second response time is unacceptable for clinical or health and safety reasons (for example operating theatres and stairways), battery back-up, with a typical response time within 0.5 seconds, is provided.

5.69 Electrical distribution within hospitals is generally provided by essential and non-essential electrical circuits. These are normally segregated; however, where this is not possible, essential services cables are wired in fire-resistant cable.

5.70 Consequently, within hospitals emergency lighting is provided by separately wired and controlled essential and non-essential electrical circuits. The luminaires connected to the essential circuits are designed to provide between 30 and 50 per cent of the normal lighting level in the event of failure of the mains supply.

5.71 In addition to the above, within each hospital department separate circuits are provided for circulation spaces. Therefore, failure of a lighting circuit supplying a circulation space will not affect the lighting circuits in the adjacent rooms and vice-versa. Generally, hospital streets are also supplied with independent essential and non-essential circuits. This large number of electrical circuits should ensure that when one lighting circuit fails as a result of fire, the other circuits will still provide acceptable levels of lighting.

Requirement

5.72 Emergency electrical services should be designed to comply with the requirements of HTM 2007 – 'Electrical services: supply and distribution' and HTM 2011 – 'Emergency electrical services'.

5.73 In the event of failure of mains supply the essential lighting circuits should be designed to provide between 30 and 50 per cent of the normal lighting level.

5.74 The distribution boards for the essential and non-essential circuits may be in the same location but should be in separate metal cabinets.

5.75 In those areas where a 15 second response time would be considered hazardous (for example stairways), emergency lighting should be provided by battery back-up giving a typical response time within 0.5 seconds and a minimum duration time of three hours.

5.76 In those areas of hospitals which are not provided with essential and non-essential circuits as required by HTM 2007 and HTM 2011, escape lighting should be provided in accordance with BS5266: Part 1: 1988 with a minimum duration time of three hours.

Special requirements for intensive therapy units (ITU)

5.77 In these departments any movement or evacuation of patients may be life-threatening; consequently additional precautions are required to address the implications of:

a. a fire and smoke in a compartment either adjacent or below;

b. a fire and smoke within the department itself.

5.78 The aim of any design should be to prevent a fire in an adjacent compartment either on the same storey or on a storey above or below requiring the evacuation of an intensive therapy unit. The compartmentation and HVAC systems should be designed so that an adequate period of time is provided to enable a fire to be detected and extinguished before it threatens the occupants.

Requirement

5.79 To reduce the possibility of smoke entering an ITU department, with the exception of doors off the hospital street, every door opening in the compartment wall should be provided with a protected lobby, each door of which will provide a minimum period of fire resistance of 30 minutes.

Sub-compartmentation in ITU departments

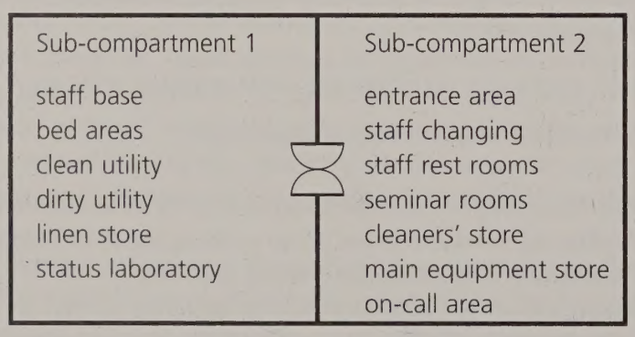
5.80 Intensive therapy units should be divided into two sub-compartments, to separate the "nursing area" from the "utility area". The following provides an example:

sub-compartment one
- staff base;
- bed areas;
- clean utility;
- dirty utility;
- linen store;
- status laboratory.

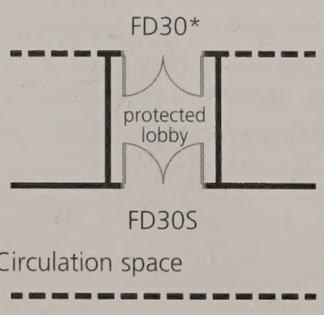
sub-compartment two
- entrance area;
- staff changing;
- staff rest rooms;
- seminar rooms;
- cleaners' store;
- main equipment store;
- bulk store;
- on-call area.

See Figure 10.

Figure 10 Special requirements for intensive therapy units (Paragraphs 5.77 to 5.80)



Lobby arrangement



60 minute FR wall

Non FR wall

Door indicated thus * may be held open on automatic door hold open devices which activate only on the operation of the alarm and detection system in ITU or the adjacent compartments

Heating and ventilation systems

5.81 The HVAC systems provided to intensive therapy units are designed so that the pressure within the department is maintained at slightly above that of the adjacent areas. In a fire emergency the continuing operation of these systems will assist in preventing smoke and other products of combustion entering the intensive therapy unit.

Requirement

5.82 In intensive therapy units, the HVAC systems should be designed so that they continue to operate in a fire emergency. The shut-down of these systems should be on the instruction of the fire brigade and should be controlled from remote panels located at either the department entrance or adjacent to the main fire alarm indicator panel.

Plant areas

5.83 The means of escape from plantrooms should be designed to take account of the fire hazard presented by the equipment or contents of the room and any hindrance to the movement of the occupants, for example low headroom.

Requirement

5.84 The escape route should be clear of obstructions.

5.85 Where a minimum of two exits are provided, the maximum travel distance from any point within a plantroom should not exceed 25 metres to the nearest exit from where alternative means of escape are provided. Of this 25 metres the maximum single direction of escape should not exceed 12 metres.

5.86 Where only one exit is provided, the maximum travel distance should not exceed 12 metres.

5.87 Where only one exit is provided, or where there is a danger of people being trapped, alternative means of escape such as ceiling hatches and ladders should be considered.

5.88 Where the risk of fire is low, the travel distances may be increased to 35 metres where there is an alternative means of escape and 25 metres where a single direction of escape only is provided.

6.0 Containment

Principle

6.1 The design and construction of the hospital shall:

a. provide sufficient resistance to the effects of fire and maintain its structural stability to provide adequate time for escape and extinguishment;

b. inhibit the spread of fire and smoke within the building;

c. inhibit the spread of fire to adjacent buildings.

Elements of structure

6.2 To prevent the premature failure of the structure, the load-bearing elements of the building are required to have a minimum period of fire resistance, in terms of resistance to collapse or failure of load-bearing capacity. The purpose of providing the structure with fire resistance is:

a. to minimise the risk to the occupants, many of whom may still be in a temporary place of safety within the hospital awaiting evacuation;

b. to reduce the risk to fire-fighters;

c. to reduce the danger to people in the vicinity of the building.

6.3 For the purposes of this document, elements of structure are:

a. a column, beam, or other member forming part of a structural frame;

b. a load-bearing wall;

c. a floor;

except where the structure supports a roof which is not essential for the stability of a wall required to have a period of fire resistance.

Requirement

6.4 The minimum period of fire resistance provided by the elements of structure should be as Table 5.

Compartmentation

6.5 The requirement for compartmentation in patient access areas of hospital is discussed in Chapter 5. Within patient access areas, compartmentation is used to divide a storey into places of temporary safety which may be used for patient refuge. In addition, compartmentation prevents rapid fire spread throughout the building and reduces the chance of fires becoming large.

6.6 Generally within hospitals the maximum size of a compartment is determined by its use: the size of the hospital department determines the size of a compartment (see paragraph 5.17).

Table 5 Fire resistance of elements of structure

	Unsprinklered	Sprinklered
Single-storey hospitals	30 minutes	30 minutes
Hospitals with a top floor no more than 12 metres above ground	60 minutes	60 minutes
Hospitals with a top floor between 12 and 30 metres above ground	90 minutes	60 minutes
Hospitals with a top floor over 30 metres above ground	120 minutes	90 minutes
Hospitals with basements no more than 10 metres deep	60 minutes	60 minutes
Hospitals with basements over 10 metres deep	90 minutes	60 minutes

Notes:

Elements of structure in relation to basements includes the ground floor slab.

Where one side of a basement is (due to the slope of the ground) open at ground level, giving an opportunity for smoke venting and access for fire-fighting, it may be appropriate to adopt the standard of fire resistance applicable to above-ground structures for elements of structure in that storey.

Where a partial sprinkler system is installed, the reduction in the fire resistance is not "automatic" but should be assessed in the specific context of the extent of the sprinkler system.

Requirement

6.7 The maximum area of a compartment should not exceed:

a. 2000 m² in a multi-storey hospital;

b. 3000 m² in a single-storey hospital.

6.8 The minimum period of fire resistance (integrity and insulation) provided by compartment walls should be:

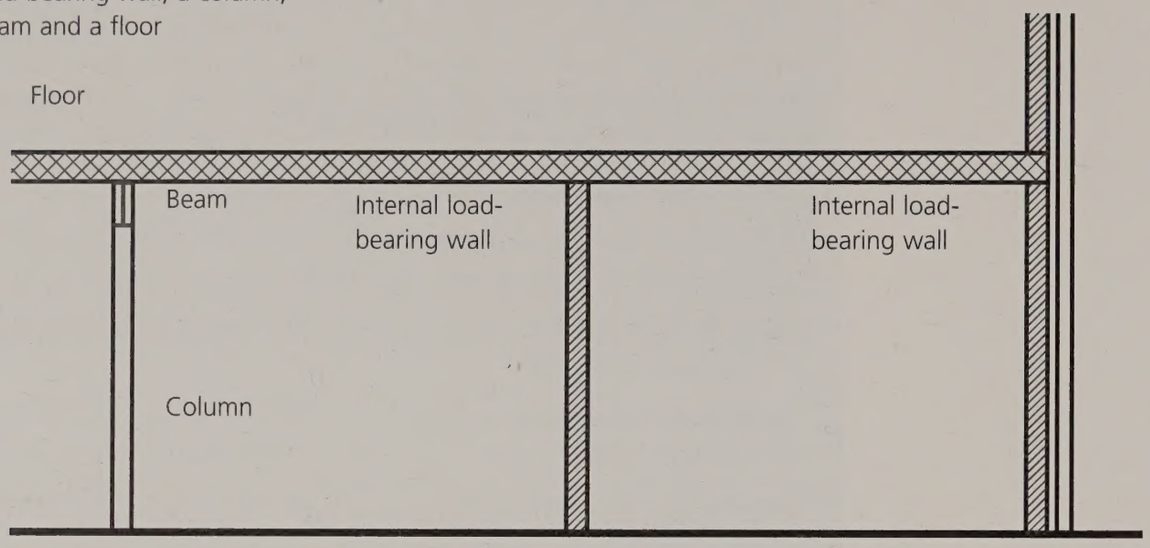
(i)	single-storey hospitals	30 minutes*
(ii)	sprinklered hospitals – storeys up to 12 metres above ground level	30 minutes
(iii)	all other hospitals including basement and floor over 12 metres above ground	60 minutes

* except where this conflicts with the requirements of Table 1.

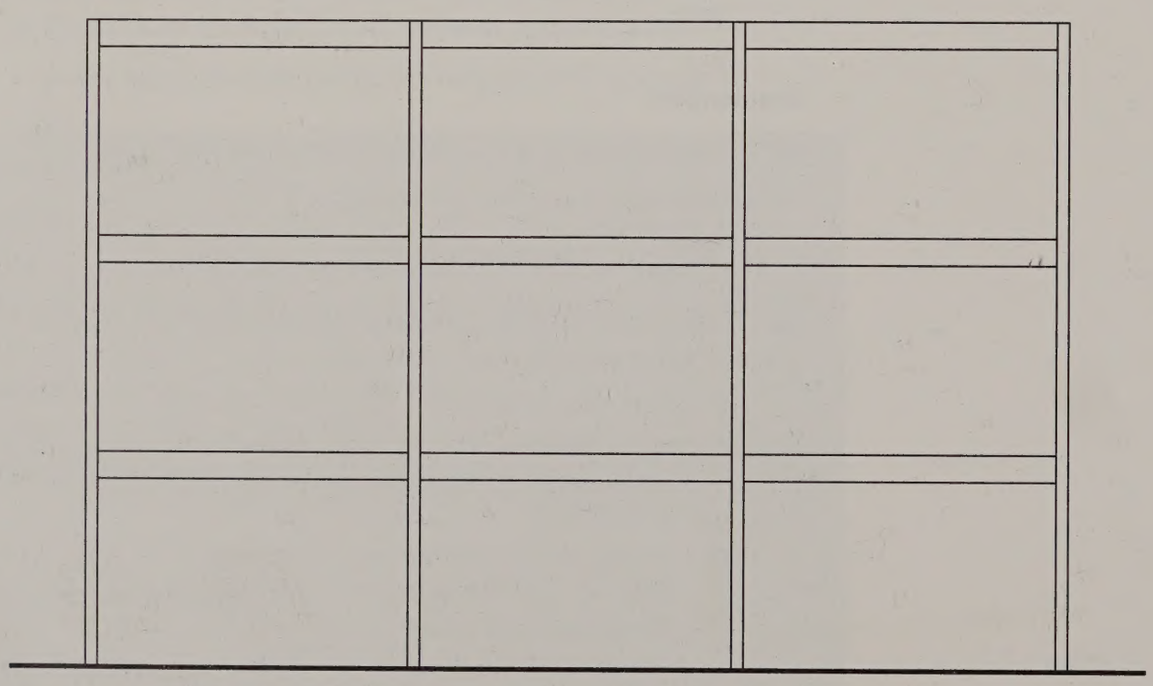
6.9 All compartment floors are considered as elements of structure and should satisfy the requirements of Table 5.

Figure 11 Elements of structure

Elements of structure:
a load-bearing wall, a column,
a beam and a floor



Elements of structure:
a column, beam, or other
member forming part of a
structural frame



Elements of structure and compartment walls

6.10 Elements of structure and compartment walls required to have a minimum period of fire resistance of 60 minutes or more, should be constructed of materials of limited combustibility. The materials used should be type i, ii, or iii as defined in Chapter 2.

6.11 Where sprinklers are installed throughout, the requirement for elements of structure and compartment walls to be constructed of materials of limited combustibility does not apply.

Glazing in a compartment wall

6.12 Any glazing provided in a compartment wall should have the same period of fire resistance (integrity and insulation) as the compartment wall.

Transfer grilles

6.13 To reduce the possibility of smoke transfer between compartments, transfer grilles should not be provided in compartment walls.

Junction of compartment walls with roofs

6.14 Compartment walls should be taken up to the underside of the roof covering or deck, and fire-stopped to maintain the fire resistance.

Openings in floors and compartment walls

6.15 All openings in floors and compartment walls should be protected to provide at least the same period of fire resistance as the compartment structure.

6.16 To maintain the integrity of compartmentation, openings should be limited to:

a. doors which have a period of fire resistance not less than that of the compartment structure (see Appendix B below);

b. openings for pipes of not more than 160 mm diameter which if exposed to a temperature of 800°C will not soften or fracture to the extent that flames or hot gases will pass through the wall of the pipe;

c. pipes of materials other than those in (b) above, of not more than 40 mm diameter;

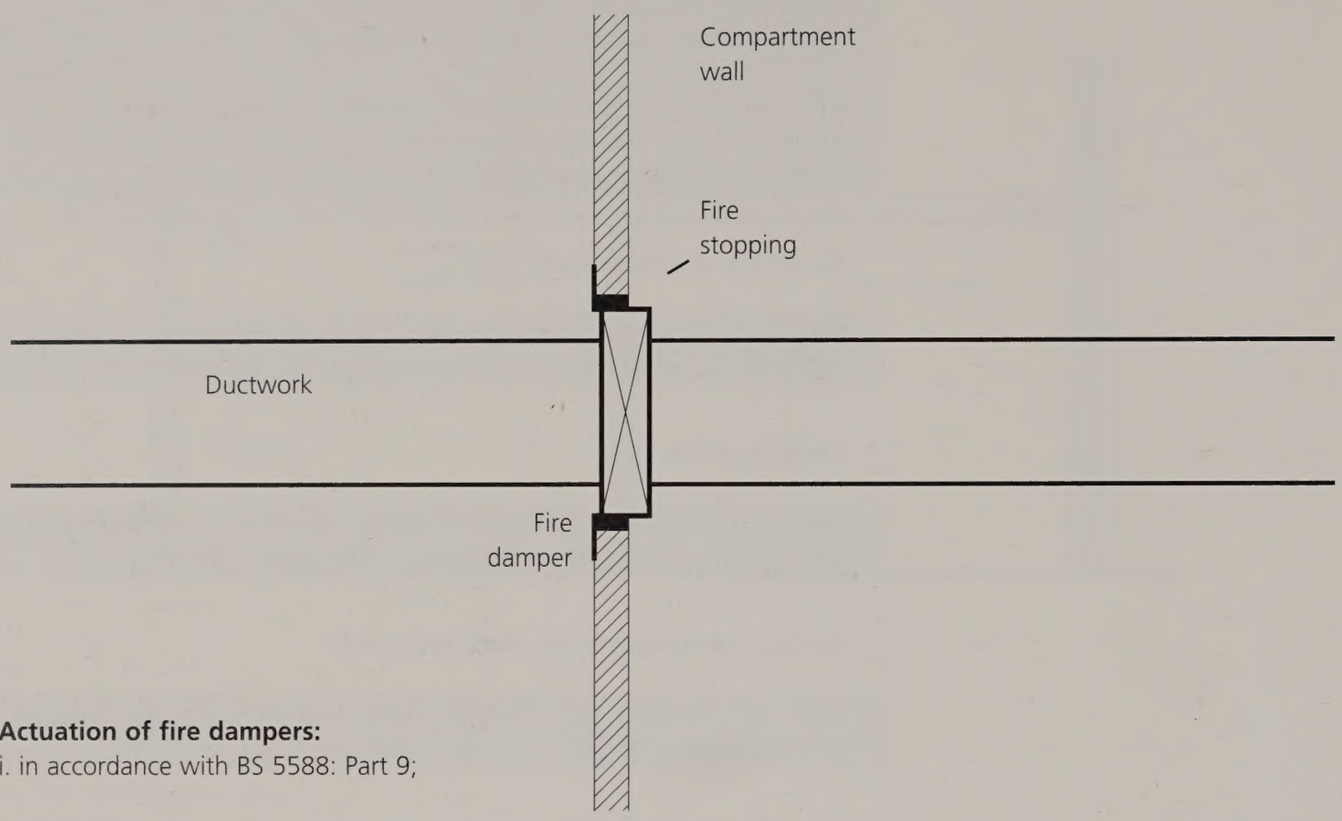
d. pipes of any diameter which are provided with a proprietary seal which has been shown by test (for the diameter of pipe proposed) to maintain the fire resistance of the compartment structure;

e. ventilation ducts which comply with the requirements of BS5588: Part 9 (see Figure 12);

f. refuse and laundry chutes of non-combustible construction which are accessed through fire-resisting doors;

g. protected shafts.

Figure 12 Fire dampers in compartment walls
(Paragraphs 6.16, 6.36 and 6.81)



Actuation of fire dampers:
i. in accordance with BS 5588: Part 9;

ii. by the operation of the alarm detection system in the compartments either side of the compartment wall.

Protected shafts

6.17 Openings in floors for stairways, lifts, escalators, and pipes and ducts, not complying with paragraph 6.15 above, should be enclosed in a protected shaft which has the same period of fire resistance (integrity, insulation and, where applicable, load-bearing capacity) as the compartment floor.

6.18 The protected shaft should form a complete barrier to fire between the different compartments which the shaft connects and be constructed from materials of limited combustibility.

6.19 Any internal glazing provided to a protected shaft should have the same period of fire resistance (integrity and insulation) as the protected shaft.

6.20 The use of rooflights over protected shafts used for stairways should be limited to those which provide a class 1 surface spread of flame on both upper and lower surfaces.

6.21 The use of protected shafts should be limited to:

a. stairways;

b. lifts;

c. escalators;

d. chutes;

e. ducts;

f. pipes.

6.22 No accommodation may be included within protected shafts.

Except pipes conveying oil as part of the operating mechanism of a hydraulic lift, and ventilation ductwork provided for the purposes of pressurising the stairway

6.23 Pipes conveying oil or gas, and ventilation ductwork, should not be located in the same protected shaft as a stairway or lift.

Opening windows are not required to be automatically operated

6.24 Means for ventilating protected shafts to provide smoke clearance should be provided, at the top of the shaft, as follows:

a. for a protected shaft containing a stairway – an openable window, or similar, providing an area of 1 m^2;

b. for a protected shaft containing a lift or lifts, a permanent opening of 0.1 m^2 for each lift.

Protected lobbies

6.25 Protected shafts for stairways and lifts should be provided with protected lobbies, except where they are accessed from a hospital street.

6.26 Protected lobbies should not be located so that they form part of a through route; that is, they should not be located across a corridor if the corridor continues beyond the protected lobby. See Figure 13.

6.27 Protected lobbies should:

a. be constructed from materials of limited combustibility and have the same fire resistance as the protected shaft;

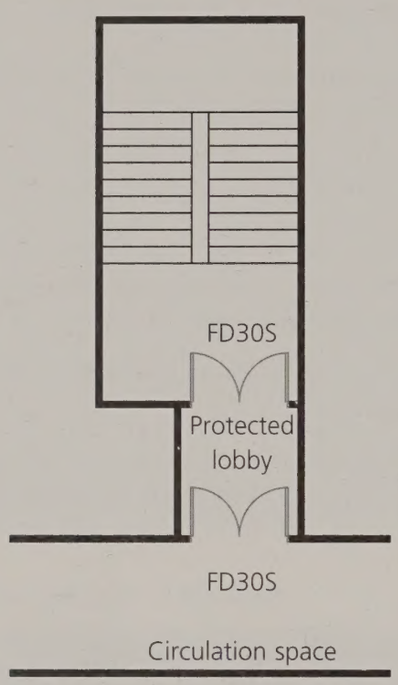
b. contain no other accommodation except that allowed for protected shafts.

Fire hazard rooms and areas

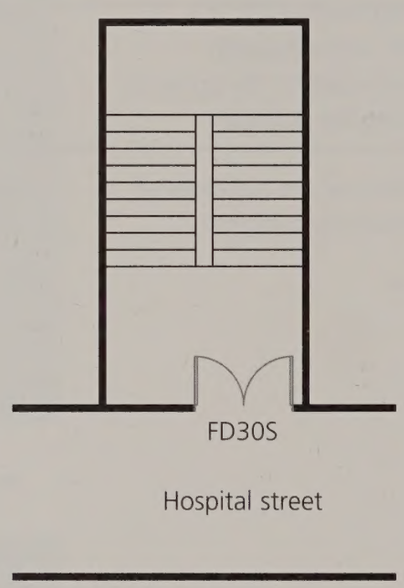
6.28 For most building types it is normally required to protect escape routes with fire-resisting walls, ceilings and doors (protected corridors). In hospitals this is not considered acceptable since the excessive number of fire-resisting doors, all fitted with self-closing devices, would be a hindrance to staff and patients during the everyday running of the hospital. For this reason the technique advocated for hospitals is to identify and segregate fire hazard rooms by at least 30 minutes fire-resisting construction.

Figure 13 Protected lobbies to stairways
(Paragraphs 6.25 to 6.27)

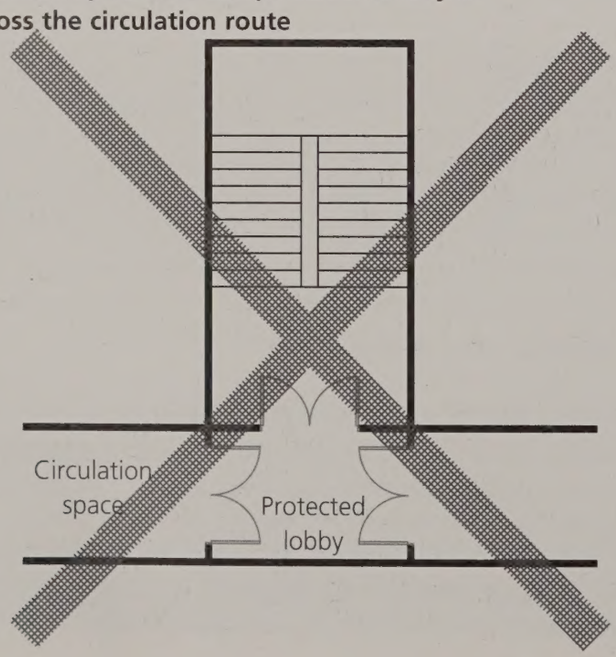
i. stairway accessed from a circulation space (protected lobby required)



ii. stairway accessed from a hospital sreet (protected lobby not required)



iii. The arrangement illustrated below is not acceptable as the protected lobby is across the circulation route



6.29 The following are examples of fire hazard rooms:

- chemical stores;
- cleaners' rooms;
- clothes storage;
- dayrooms;
- disposal rooms;
- laboratories;
- lift motor rooms;
- linen stores;
- patient bedrooms provided for:
  - (i) elderly people;
  - (ii) those suffering from a mental illness;
  - (iii) people with learning difficulties;
- staff changing and locker rooms;
- store rooms;
- ward kitchens;
- X-ray film and record stores;
- all rooms within the main laundry in which delivery, sorting, processing, packing and storing are carried out.

Requirement

6.30 Fire hazard rooms and areas should be enclosed in 30 minutes fire-resisting construction (integrity and insulation). Walls may be terminated at ceiling level provided that:

a. the ceiling is non-demountable and has a minimum period of fire resistance of 30 minutes, when tested (complete with any lighting units) from below in accordance with BS476: Parts 20 and 22;

b. ducts perforating the ceiling are fitted with fire shutters operated by fusible links;

c. conduits, pipes etc perforating the ceiling are fire-stopped and comply with the requirements of paragraph 6.16 above.

6.31 Where sprinklers are installed, there is no requirement to enclose fire hazard rooms in fire-resisting construction.

Glazed screens

6.32 Uninsulated fire-resisting glazed screens may only be provided in walls enclosing the following fire hazard rooms:

a. dayrooms;

b. laboratories;

c. laundry – between supervising office and work area only.

The maximum area of glazing should be limited to 1 m^2 in any one room.

6.33 There is no limit on the use of glazed screens which provide a minimum period of fire resistance of 30 minutes when tested to the relevant parts of BS476 (integrity and insulation).

Transfer grilles

6.34 To reduce the possibility of smoke transfer between compartments, transfer grilles should not be provided to fire hazard rooms.

Ventilation ductwork

6.35 Ventilation ductwork should comply with the requirements of BS5588: Part 9 and HTM 2025 – 'Ventilation in healthcare premises'.

6.36 Ductwork passing through compartment and sub-compartment walls should be provided with fire dampers in accordance with Figures 12 and 14.

6.37 Ductwork passing through, or over, fire hazard rooms should be provided with fire dampers in accordance with Figure 15.

6.38 Ductwork passing through cavity barriers should be provided with fire dampers in accordance with Figure 16.

Cavity barriers

6.39 Concealed spaces or cavities in the construction of a building may permit the rapid spread of fire and smoke. It is possible for fire and smoke to be transferred to areas remote from the seat of the fire by way of uninterrupted concealed spaces. For this reason it is essential that fire-resisting barriers are provided to restrict the size of these concealed spaces.

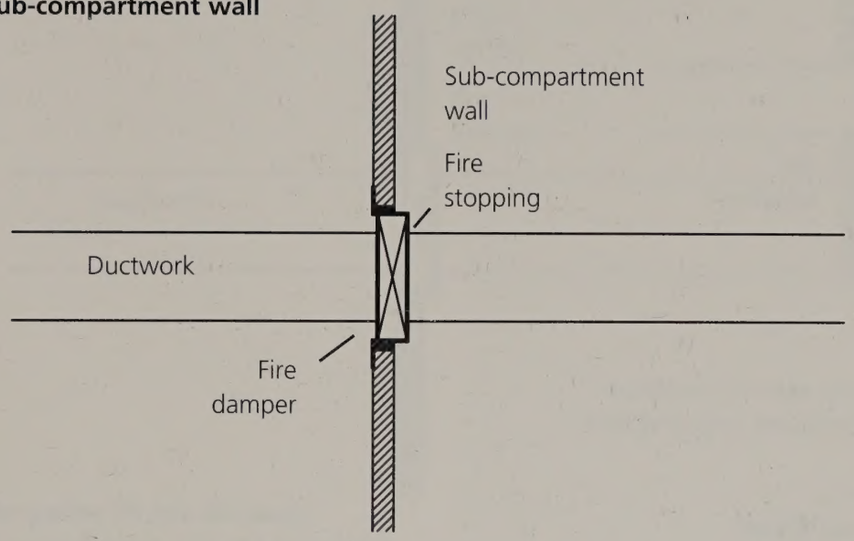
6.40 In hospitals, the sub-division provided through the requirements for hazard protection, sub-compartmentation and compartmentation is such that generally the additional sub-division of ceiling voids for cavity barriers is not required. The exception to this is where sub-compartment walls, and walls to fire hazard rooms, are terminated at 30 minute fire-resisting ceilings.

6.41 Irrespective of the above, there is a requirement to prevent the inter-connection of horizontal and vertical cavities.

6.42 Guidance on the construction and fixing of cavity barriers is provided in Appendix E.

Figure 14 Fire dampers in sub-compartment walls
(Paragraphs 6.36 and 6.82)

i. ductwork passing through sub-compartment wall

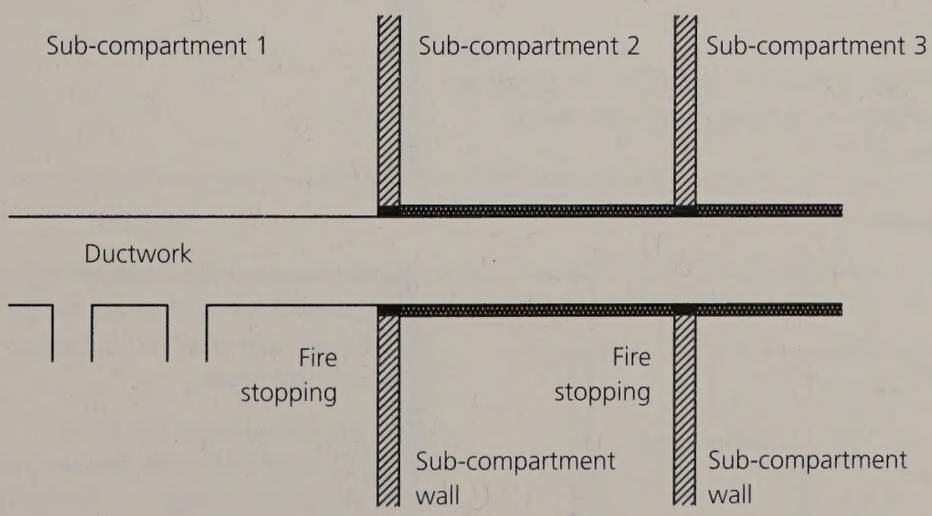


Actuation of fire dampers:
i. in accordance with BS5588: Part 9

ii. by fusible link with a nominal operating temperature of 74°C

iii. if sprinklers are fitted, by the operation of the alarm and detection system in the sub-compartments either side of the sub-compartment wall.

ii. ductwork serving one compartment only

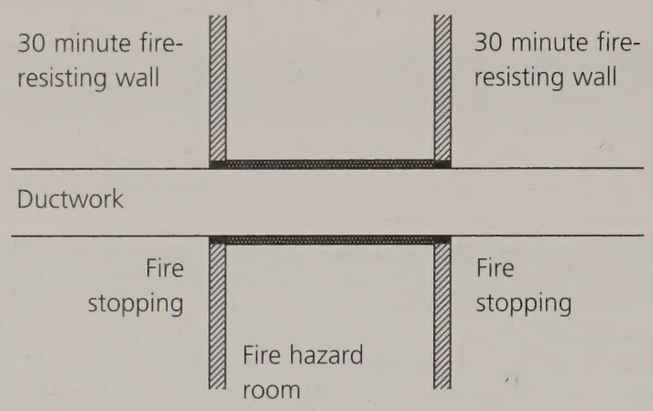


i. fire dampers not required

ii. ductwork in sub-compartments 2, 3 etc to have 30 minutes fire resistance (integrity and insulation) when tested to the relevant parts of BS476.

Figure 15 Fire dampers to fire hazard rooms
(Paragraphs 6.37 and 6.82)

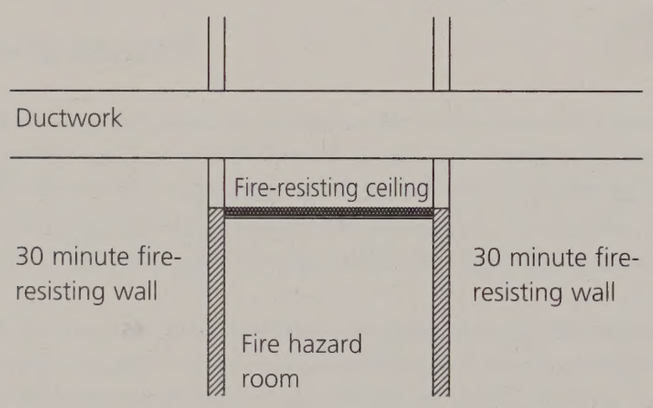
i. ductwork passing through but not serving fire hazard room



i. fire dampers not required;

ii. ductwork in the hazard room to have 30 minutes fire resistance (integrity and insulation) when tested to the relevant parts of BS476.

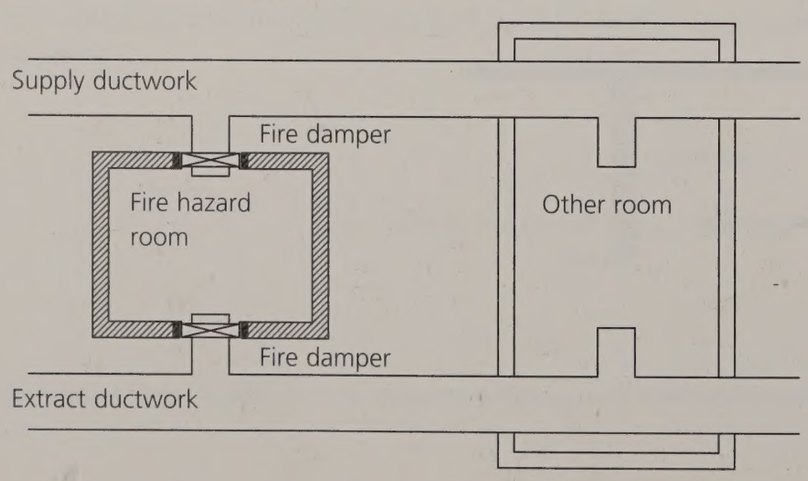
ii. ductwork passing over fire hazard room fitted with fire-resisting ceiling



i. fire dampers not required;

ii. ceiling to be non-demountable and have a minimum period of fire resistance of 30 minutes, when tested (complete with any lighting units) from below in accordance with BS476 Parts 20 and 22.

iii. ductwork serving fire hazard rooms



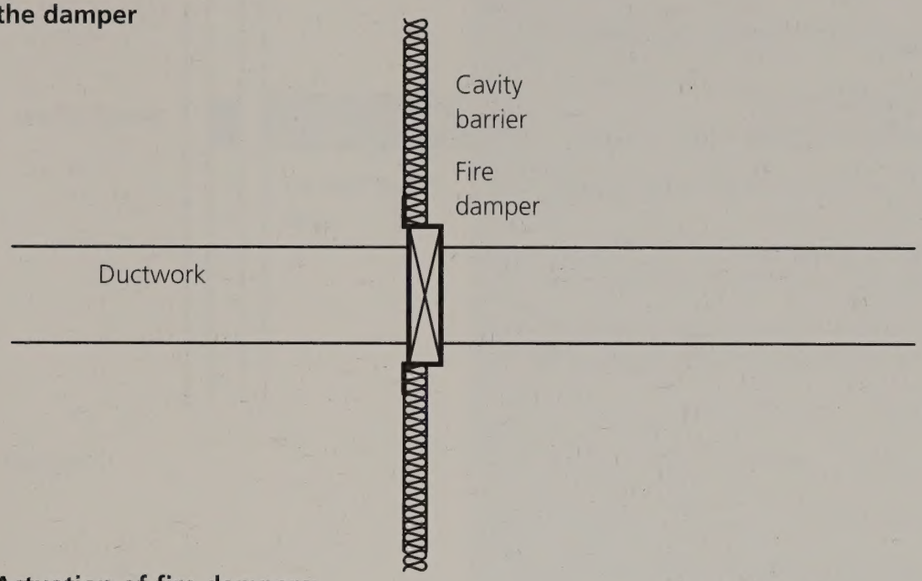
i. ducts should not pass through the hazard room if the duct serves the fire hazard room and other rooms beyond the fire hazard room;

ii. the fire hazard room should be served by spurs fitted with fire dampers operated by fusible links;

iii. where flexible connections are used they should comply with BS5588: Part 9 and not pass through the fire-resisting walls

Figure 16 Ductwork passing through cavity barriers
(Paragraphs 6.38, 6.47 and 6.82)

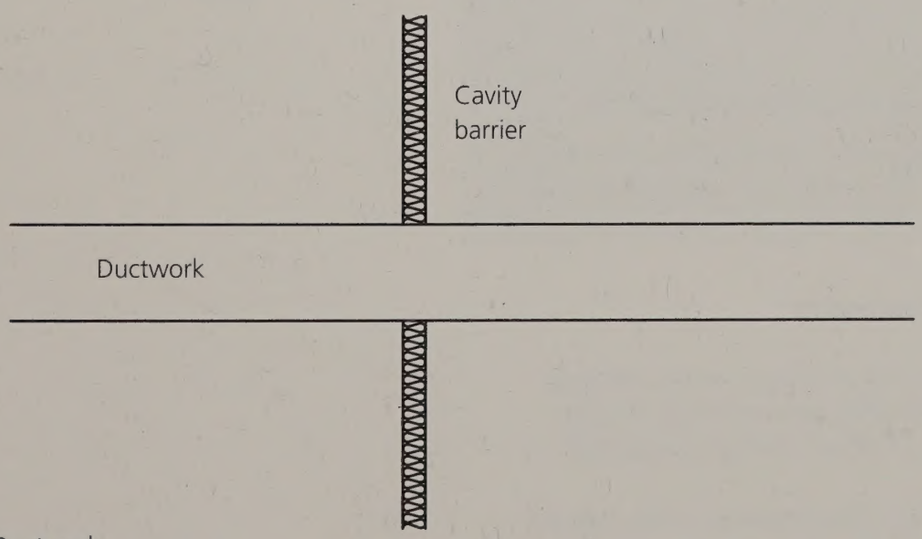
i. ductwork fitted with the damper



Actuation of fire dampers:
i. in accordance with BS5588: Part 9

ii. by fusible link with a nominal operating temperature of 74°C

ii. ductwork serving one compartment only



Ductwork
i. non-combustible

ii. has a minimum period of fire resistance of 30 minutes (integrity) when tested to BS476 Part 24

Requirement

6.43 With the exception of the ceiling void above operating departments (see below), 30 minute fire-resisting barriers should be provided to sub-divide concealed roof or ceiling voids. These should be positioned to coincide with sub-compartment walls and walls to fire hazard rooms.

6.44 The maximum area of uninterrupted roof or ceiling void should not exceed 400 m^2.

6.45 30 minute fire-resisting cavity barriers should also be provided:

a. to prevent the inter-connection of vertical and horizontal cavities;

b. at the intersection of fire-resisting construction and elements containing a concealed space (Figure 17 provides examples);

c. within the void behind the external face of rainscreen cladding, at every floor level and on the line of compartment walls abutting the external wall.

6.46 Cavity barriers should not be provided:

a. in cavity walls as illustrated in Figure 18; or

b. in double-skin insulated roof sheeting as illustrated in Figure 19(i); or

c. below a floor next to the ground or oversite concrete providing:

(i) the cavity is less than 1 m in height; or

(ii) it is not accessible by persons; and

(iii) there are no openings in the floor such that it is possible for combustibles to accumulate in the cavity.

Openings in barriers

6.47 Openings in barriers should be limited to those for:

a. doors which have at least 30 minutes fire resistance;

b. pipes (see paragraph 6.16);

c. cables or conduits;

d. openings fitted with a suitably mounted automatic fire shutter;

e. ducts which, unless they are fire-resisting, are fitted with a suitably mounted automatic fire shutter where they pass through the cavity barrier. See Figure 16.

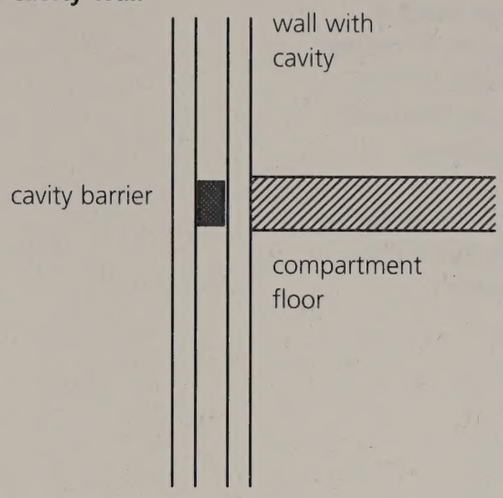
Cavity barriers above operating departments

6.48 The complexities of ventilation ductwork systems above operating departments mean that the provision of cavity barriers would seriously compromise service access and means of escape for maintenance staff.

6.49 Additionally, operating departments have restricted access, they are well supervised when in use, and hazard areas are enclosed within fire-resisting construction.

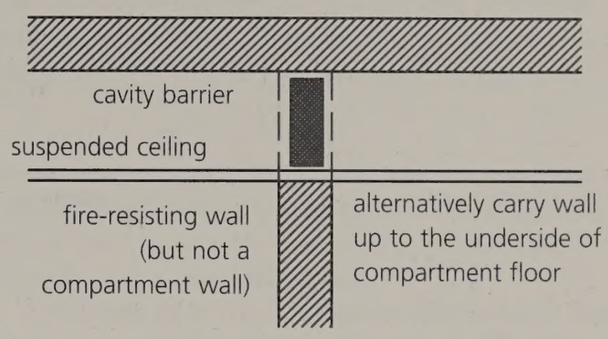
Figure 17 Cavity barriers interrupting concealed spaces (Paragraph 6.45)

i. cavity wall



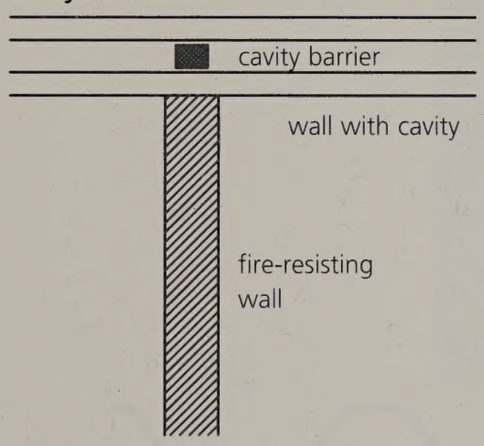
Section

ii. void above suspended ceiling



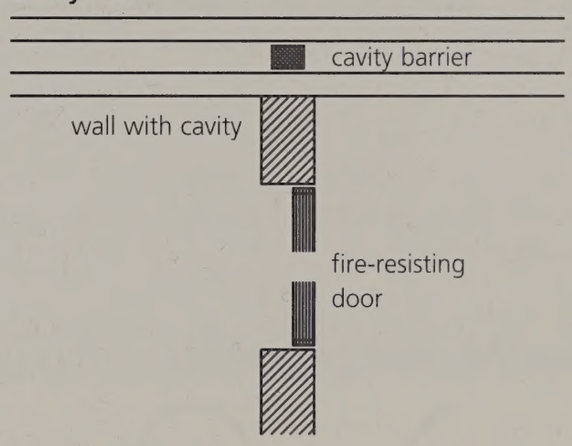
Section

iii. cavity wall



Plan

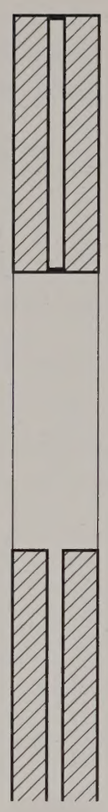
iv. cavity wall



Plan

Figure 18 Cavity wall not requiring cavity barriers (Paragraph 6.46)

Section through cavity wall



Note: Combustible materials should not be placed in or exposed to the cavity, except for:

i. timber lintels, window or door frames, or the ends of timber joists;

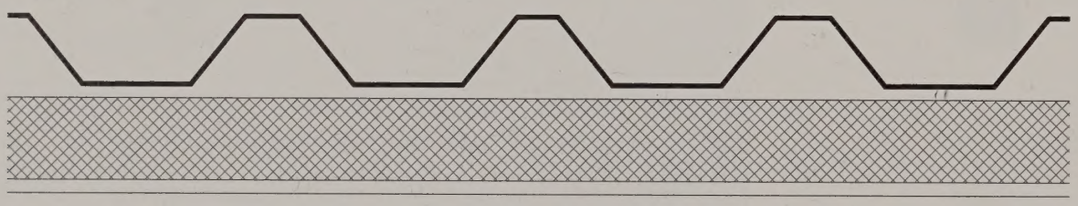
ii. pipes, conduit or cable;

iii. DPC, flashing cavity closer or wall tie;

iv. thermal insulating material

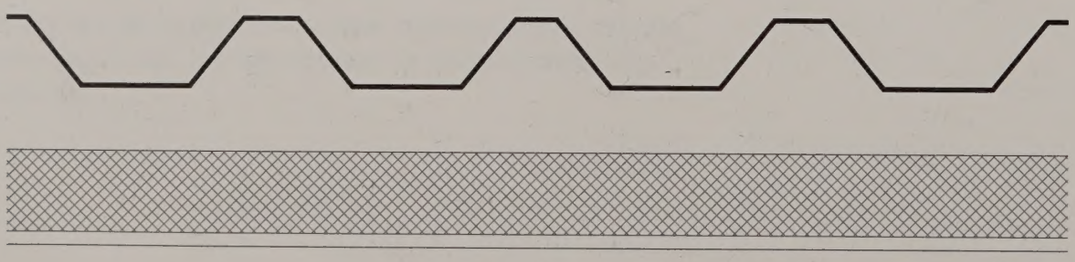
Figure 19 Cavity barriers in double-skinned insulating roof sheet (Paragraph 6.46)

i. acceptable without cavity barriers



The insulation should make contact with both skins of sheeting

ii. cavity barriers required



Requirement

6.50 Cavity barriers should not be provided over operating departments.

Internal spread of flame – linings

6.51 The surface finish applied to walls and ceilings can contribute to the spread of a fire. Some finishes will transfer fire from one area to another very quickly by "surface spread of flame". This not only makes the fire difficult to control, but provides additional fuel, which will increase the severity of the fire.

6.52 Surface finishes which can be effectively tested for "surface spread of flame" are rated for performance by reference to the method specified in BS476: Part 7: 1971 or 1987 under which materials or products are classified 1, 2, 3 or 4, with Class 1 being the highest.

6.53 Class 0 is the highest product performance classification; however, it is not a classification identified in any British Standard test.

Requirement

6.54 Wall and ceiling finishes should meet the classifications in Table 6.

Table 6 Limitations on wall and ceiling finishes

Location	Walls	Ceilings
Circulation spaces	Class 0	Class 0
Other rooms	Class 0	Class 1
Small rooms (max 4 m²)	Class 1	Class 1

Notes:

The limitations on surface finishes do not apply to:

(i) the demountable sanitary "back panels" commonly used in hospitals to provide access for maintenance behind washhand basins, toilets, showers etc; and

(ii) rooms providing a specialist function (for example audiology booths) where other functional criteria dictate the surface finish.

Rooflights

6.55 Rooflights should also meet the requirements of Table 6. However, plastic rooflights with a Class 3 rating for surface spread of flame may be used, provided that the limitations imposed by paragraph 6.59 below are observed.

Thermoplastic materials

6.56 Thermoplastic materials (see Appendix C) which cannot meet the performance requirements given in Table 6 may be used in rooflights and lighting diffusers in suspended ceilings, if they comply with the requirements in paragraphs 6.58 and 6.59 below.

6.57 The guidance on the use of thermoplastic lighting diffusers applies irrespective of whether the lighting diffuser forms part of the ceiling or is attached to the soffit of, or suspended beneath, a ceiling.

Requirement

6.58 Thermoplastic rooflights and lighting diffusers with a classification of lower surface of TP(a) may be used in all locations, except stairways, with no restrictions on:

a. the maximum area of each diffuser or rooflight;

b. the maximum total area of diffusers and rooflights;

c. the minimum separation between diffusers and rooflights.

6.59 Thermoplastic rooflights and lighting diffusers with a classification of lower surface TP(b) and rooflights with a Class 3 rating may be used in all areas, with the following restrictions:

a. the maximum area of each diffuser or rooflight should be no more than 5 m^2;

b. the maximum total area of diffusers and rooflights, as a percentage of the floor area of the space in which they are located, should be no more than 15 per cent;

c. the minimum distance between diffusers and rooflights should be not less than 3 metres.

6.60 Thermoplastic rooflights with a classification of upper surface TP(b) should not be used.

6.61 Thermoplastic lighting diffusers should not be used in a fire-resisting ceiling unless they have been satisfactorily tested as part of a ceiling assembly that provides the appropriate fire protection.

6.62 The minimum distance from a relevant boundary of thermoplastic rooflights with a classification of upper surface of TP(a) should be not less than 6 metres.

External fire spread

6.63 In certain circumstances it may be necessary for the external walls or roofs of a hospital to provide a period of fire resistance to prevent fire spreading to adjacent buildings or parts of the same building in different compartments.

6.64 For walls, this requirement is determined by a combination of space separation between buildings and the amount of unprotected area within the walls.

6.65 Generally, roofs are the topmost element of the building and as a consequence are not required to provide a period of fire resistance from below. However, where a low-level roof abuts an external wall of a patient access area, a portion of the roof should provide some fire resistance, to prevent the fire spreading through the roof to other parts of the same building in different compartments.

Requirement

6.66 With the exception of unprotected areas, the minimum period of fire resistance provided by external walls should be as in Table 7.

Table 7 Minimum period of fire resistance of external walls

Height to the top floor	Minimum period of fire resistance
Not more than 5 metres	30 minutes
Over 5 metres	60 minutes

Notes:

1. The minimum period of fire resistance relates to integrity and load-bearing capacity. The minimum provision for insulation is 15 minutes, unless the external wall is less than one metre from a boundary or adjacent building, when the requirement for insulation should be the same as that for integrity and load-bearing capacity.
2. An external wall which is also an element of structure should comply with Table 5.

Space separation

6.67 In hospitals up to 12 metres in height the maximum percentage of unprotected area in an external wall, in relation to the distance to adjacent compartments, buildings or boundaries, should be determined from the graph in Figure 20.

6.68 In hospitals over 12 metres in height the maximum percentage of unprotected area in an external wall, in relation to the distance to adjacent compartments, buildings or boundaries, should be determined from the methods set out in the BRE Report: 'External fire spread: building separation and boundary distances'.

6.69 When calculating the amount of unprotected area:

a. small unprotected areas as indicated in Figure 23 may be disregarded;

b. an external surface of combustible material more than 1 mm thick should be counted as an unprotected area amounting to half the actual area of the combustible material.

Canopies

6.70 Provided a canopy is more than 1 m from a relevant boundary, the provision for space separation may be disregarded.

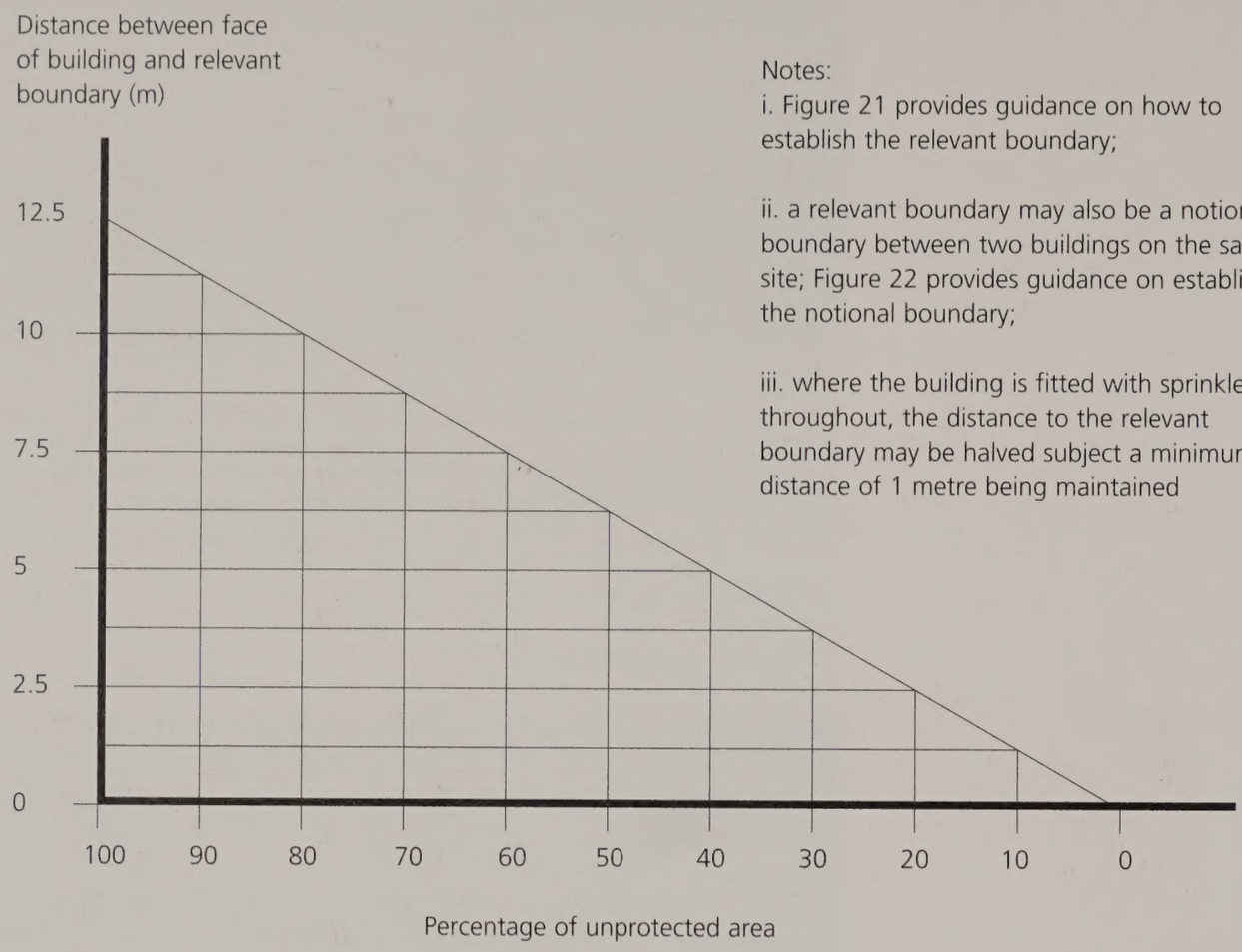
Surfaces of external walls

6.71 The surfaces of external walls of hospitals should provide a surface spread of flame classification of Class 0.

Surfaces of roofs

6.72 All hospital roof coverings should have a minimum designation of AC, when tested in accordance with BS476: Part 3: 1958.

Figure 20 Permitted unprotected area (Paragraph 6.67)



Method of determining the amount of unprotected area in an external wall

Notes:

i. Figure 21 provides guidance on how to establish the relevant boundary;

ii. a relevant boundary may also be a notional boundary between two buildings on the same site; Figure 22 provides guidance on establishing the notional boundary;

iii. where the building is fitted with sprinklers throughout, the distance to the relevant boundary may be halved subject a minimum distance of 1 metre being maintained

Figure 21 Relevant boundary area

For a boundary to be relevant it should

a. coincide with; or

b. be parallel with; or

c. be at an angle of not more than 80° to

the side of the building

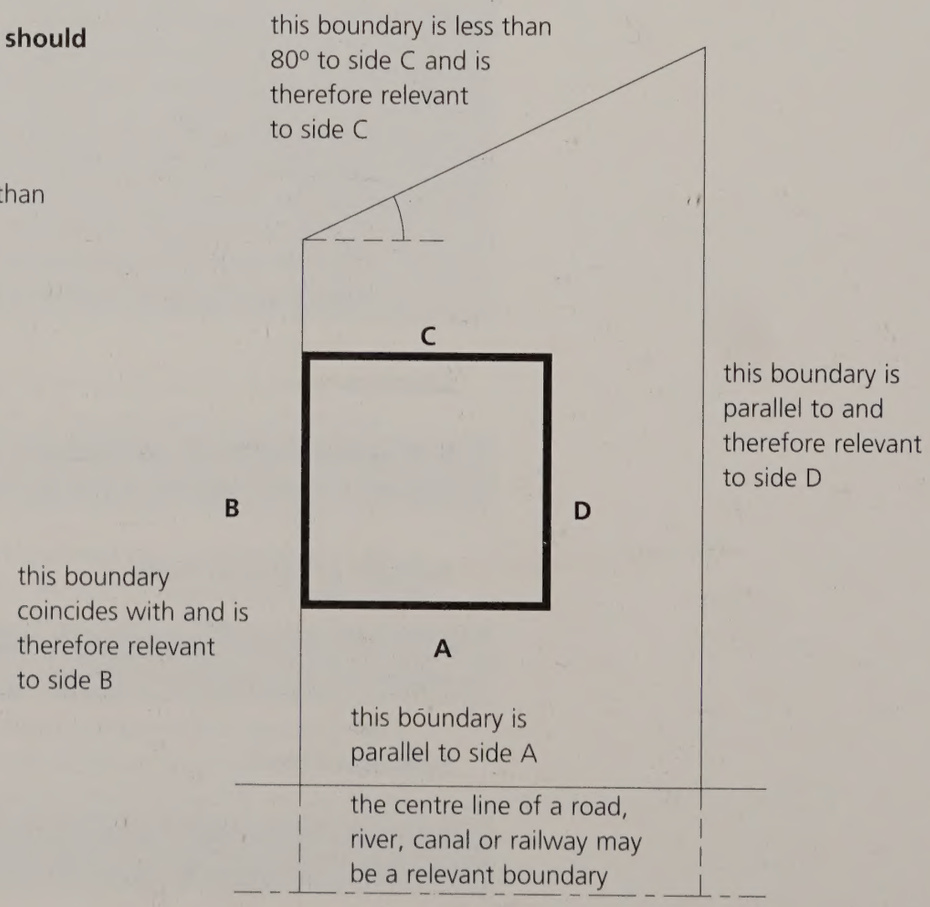
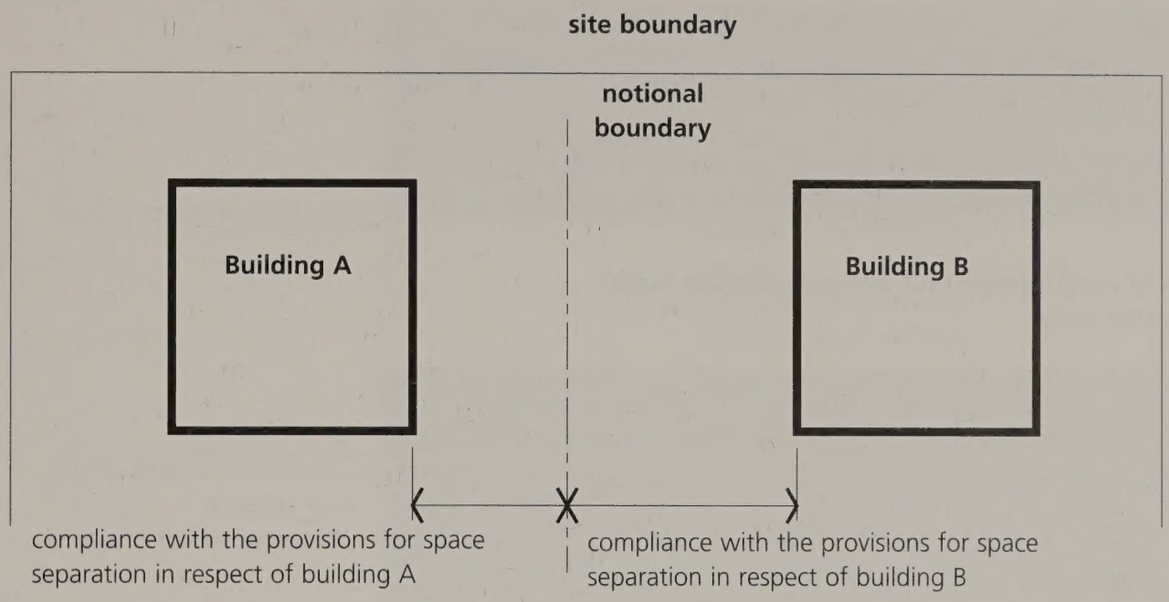


Figure 22 Notional boundary



The notional boundary should be set in the area between the two buildings using the following rules:

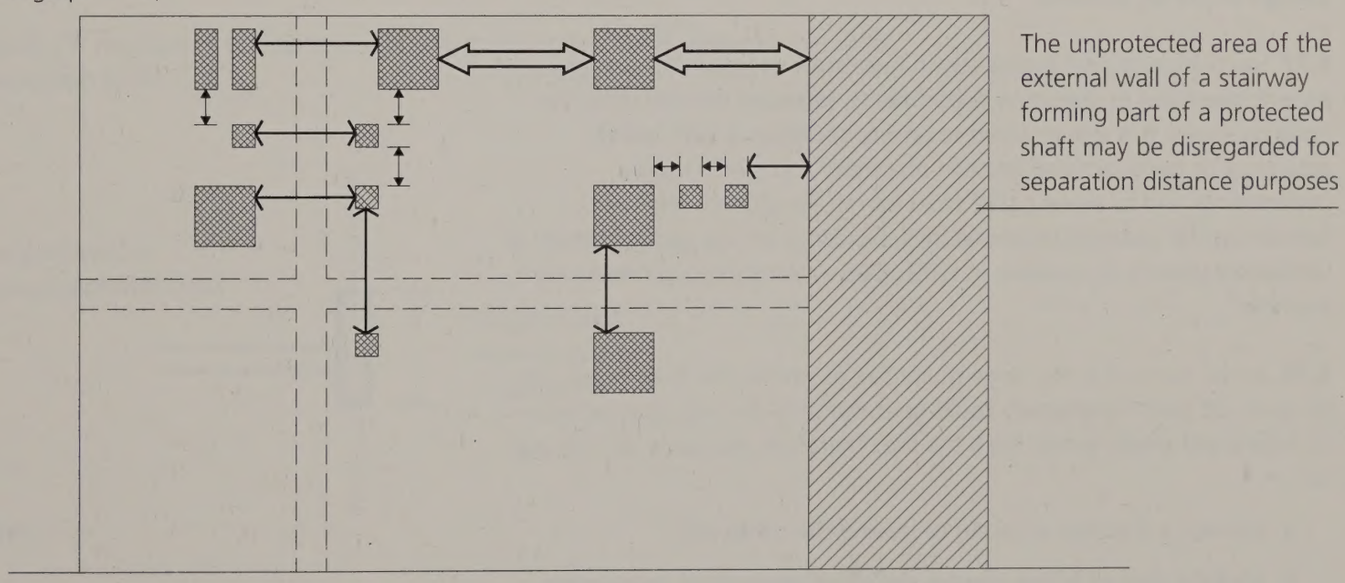
a. the buildings should be on the same site;

b. the notional boundary is positioned so that one of the buildings would comply with the provisions for space separation having regard to the amount of its unprotected area;

(In practice, if one of the buildings is existing, the position of the boundary will be set by the space separation factors for that building)

d. the siting of the new building, or the second building if both are new, can then be checked to see that it also complies – using the boundary as the relevant boundary for the second building.

Figure 23 Unprotected areas which may be disregarded in relation to space separation (Paragraph 6.69)



Unprotected areas which may be disregarded for space separation purposes

represents an unprotected area of not more than 1 m² which may consist of two or more smaller areas within an area of 1 m × 1 m

represents an area of not more than 0.1 m²

Dimensional restrictions

4 m minimum distance

1.5 m minimum distance

dimension unrestricted

Junction of walls and low-level roofs

6.73 Where a roof abuts an external wall, the roof should provide a minimum period of fire resistance of 60 minutes (integrity and insulation) for a distance of 3 metres from the wall. See Figure 24.

6.74 Where sprinklers are installed throughout the area below the low-level roof, the requirement of paragraph 6.73 above does not apply.

Junction of compartment and sub-compartment walls and external walls

6.75 Where:

a. a compartment wall (or sub-compartment wall) meets an external wall;

or

b. a protected shaft meets an external wall,

a one metre-wide storey-height strip of external wall, which has a similar period of fire resistance, should be provided to prevent lateral fire spread. See Figure 25.

6.76 Where sprinklers are installed on both sides of the compartment (sub-compartment wall), the requirements of paragraph 6.75 do not apply.

Additional requirements for the operation of HVAC systems

Design of HVAC systems

6.77 Ventilation is used extensively in healthcare premises for primary patient treatment in operating departments, intensive therapy units and isolation suites. It is also installed to ensure compliance with quality assurance of manufactured items in pharmacy and sterile supply departments and to protect staff from harmful organisms and toxic substances, for example in laboratories. Guidance on the general design of ventilation systems in available in HTM 2025 – 'Ventilation in healthcare premises'.

6.78 In the event of a fire, large quantities of smoke and toxic gases can be given off which potentially could be transferred through the ductwork to rooms and areas remote from the fire. Therefore measures are required to:

a. prevent a fire from entering or leaving the ductwork;

b. limit the spread of fire, smoke and other products of combustion within the ductwork;

c. prevent a breach in the integrity of an enclosing fire-resisting element of construction where penetrated by ductwork.

Figure 24 Fire resistance at junction of external walls and low-level roofs (Paragraph 6.73)

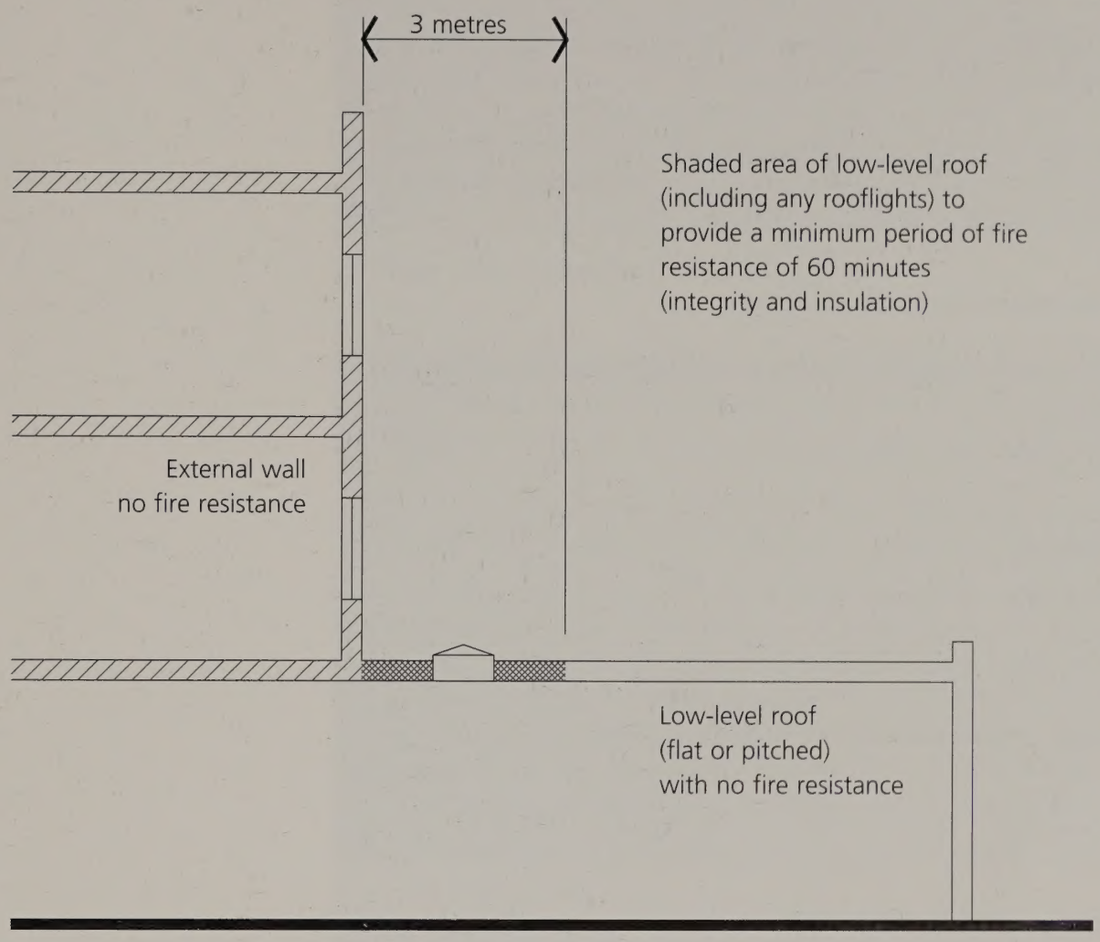
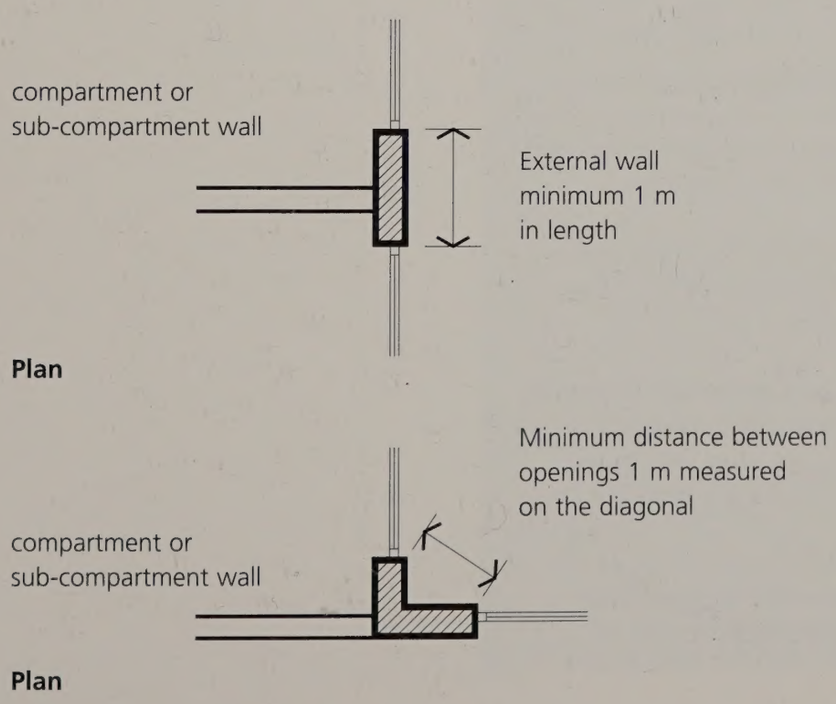


Figure 25 Junction of compartment or sub-compartment walls with external walls (Paragraph 6.75)



Requirement

6.79 Ventilation systems should be designed and installed to comply with HTM 2025 – 'Ventilation in healthcare premises' and BS5588: Part 9: 1989 'Code of practice for ventilation and air-conditioning ductwork', and the guidance below.

6.80 Ventilation systems should not be common to both patient areas and hazard departments. Fresh air intakes should be positioned to avoid the possibility of the intake of smoke and toxic gases.

Location and operation of fire dampers

6.81 Fire dampers in ductwork passing through compartment walls should be actuated:

a. in accordance with BS5588: Part 9; and

b. by the operation of the alarm and detection system in the compartments either side of the compartment wall.

See Figure 12.

6.82 Fire dampers in ductwork passing through sub-compartment walls, cavity barriers and walls enclosing fire hazard rooms should be actuated by thermal release mechanisms only. See Figures 14, 15 and 16.

6.83 Thermally actuated release mechanisms should be set to operate at 74°C.

Operation of ventilation plant

6.84 The ventilation plant should not be automatically shut down on the operation of the automatic fire alarm and detection system. The shut-down of the system should be under the instruction of the fire brigade and should be controlled from panels located either at department entrances or adjacent to the main fire alarm indicator panels.

Additional requirements for car parks

6.85 Buildings or parts of buildings used as parking for cars and other light vehicles have a well-defined fire load which is not particularly high.

6.86 There is some evidence that fire spread is unlikely from vehicle to vehicle. Additionally, where the car park is well ventilated there is a low probability of fire spread from one storey to another.

6.87 Ventilation is the important factor and, as heat and smoke cannot be dissipated as readily from a car park that is not open-sided, fewer concessions are made. The following guidance is concerned with three ventilation methods: open-sided (high level of ventilation), natural ventilation, and mechanical ventilation.

6.88 Where it is proposed to include car parking under any part of the hospital, the following additional requirements should be provided.

Requirement

All car parks

6.89 Access from the car park to the hospital should be through a protected lobby. In addition, vertical access from the car park to the hospital should be via a stairway or stairways, provided with protected lobbies, serving the car park storeys and providing access to only **one** storey of the hospital.

Open-sided car parks

6.90 Where the car park has permanent openings at each level, having an aggregate ventilation area of not less than 5 per cent of the floor area, of which half should be in two opposing walls, no additional mechanical ventilation is required.

Car parks which are not open-sided

6.91 Where car parks do not have the standard of ventilation set out in paragraph 6.90, they are not regarded as open-sided. However, they will still require some ventilation; this may be by natural or mechanical means.

6.92 In car parks which are not open-sided, the following provision of natural ventilation is considered adequate:

a. each storey should be ventilated by permanent openings, having an aggregate ventilation area of not less than 2.5 per cent of floor area at that level;

or

b. smoke vents should be placed at ceiling level, having an aggregate permanent opening of not less than 2.5 per cent of the floor area and arranged to provide a through draught.

6.93 In basement and enclosed car parks it may not be possible to obtain the minimum requirements for natural ventilation set out in paragraph 6.92. In such cases mechanical ventilation should be provided as follows:

a. the system should be independent of any other ventilation system and be designed to operate at six air changes per hour for normal petrol vapour extraction, and at ten air changes per hour in a fire condition;

b. the system should be designed to run in two parts, each part capable of extracting 50 per cent of the rates set out in (a) above, and designed so that each part may operate singly or simultaneously;

c. each part of the system should have an independent power supply which would operate in the event of failure of the mains supply;

d. extract points should be arranged so that 50 per cent of the outlets are at high level, and 50 per cent at low level;

e. the fans should be rated to run at 400°C for a minimum of 60 minutes, and the ductwork and fixings should have a melting point of not less than 800°C.

Sprinklers

6.94 The guidance in this document does not require the installation of sprinklers in patient care areas of hospitals. However, the design team may wish to adopt a different approach to fire safety by using sprinklers specifically designed to provide life safety protection, as an integral part of the fire safety strategy.

6.95 A sprinkler has two functions:

- to detect a fire at an early stage; and
- to distribute water on the fire area in order to limit or extinguish the fire.

6.96 Life-safety systems are defined in BS5306: Part 2: 1990 as "... sprinkler systems forming an integral part of measures required for the protection of life". The performance of life safety sprinklers can be enhanced by the specification and installation of quick response sprinkler heads which enable the activation of the system quickly after the heads have reached their operating temperature. This response is quicker than conventional heads which have been developed for property protection.

6.97 The time interval to the sprinkler head to reaching its operating temperature and the release of water through the system is dependent on the thermal inertia of the head. The degree of thermal inertia in the head is determined by the sensitivity of the head. The sensitivity of the sprinkler head is expressed by its response time index (RTI); this is a constant, independent of gas temperature and velocity. Quick response sprinkler heads have a very low RTI value, when compared to an average soldered strut type, or the 8 mm glass bulb type. The quick response head will react more quickly to a given fire because of its lower thermal inertia, even though the nominal temperature of operation is the same as the other sprinkler heads.

6.98 Where it is proposed to install life-safety sprinklers in hospitals, the sprinkler system should be designed and installed in accordance with the guidance below.

6.99 The sprinkler installation should be designed and installed in accordance with the guidance in BS5306: Part 2: 1990 'Fire extinguishing installations and equipment on premises', and 'Rules for automatic sprinkler installations' issued by the Loss Prevention Council.

6.100 In patient access areas of hospitals the sprinkler system should be a life safety system, fitted with quick response heads as defined in the LPC Technical Bulletin TB20: 1994.

6.101 Areas of the hospital not provided with sprinkler protection should be separated from those areas which are of 60 minute fire-resisting structure.

Effect on other fire precautions

6.102 In those parts of the hospital where sprinkler systems are provided the affect of sprinklers on the overall package of fire precautions has to be considered to ensure that a cost-effective fire safety strategy is provided. Where sprinklers are installed in hospital premises in accordance with the above guidance, some of the requirements of this document may be modified to take account of the affect of sprinkler operation at an early stage of fire development.

6.103 Where sprinklers are installed to the guidance above the following guidance may be modified:

- progressive horizontal evacuation (paragraphs 5.4 to 5.10);
- glazing in sub-compartment walls (paragraphs 5.27 to 5.29);
- elements of structure (paragraphs 6.2 to 6.4 and 6.10);
- compartmentation (paragraphs 6.5 to 6.11);
- fire hazard rooms and areas (paragraphs 6.28 to 6.34);
- external fire spread (paragraphs 6.63 to 6.76).

7.0 Fire extinguishment

Principle

7.1 The design and construction of the hospital should ensure that fires can be extinguished effectively and quickly by the occupants or by the emergency services. Adequate provision should be made around the building and within the site to enable fire appliances to gain access to the building.

7.2 The fire brigade, once alerted, will attend the fire quickly and once there, should be provided with adequate facilities for the protection of life and property. Particular matters which require consideration are:

a. site access;

b. vehicular access around the buildings for fire appliances;

c. access into the building for the fire-fighting personnel;

d. the provision of fire mains within the building;

e. venting for heat and smoke from basement areas.

Site access

7.3 When considering site access for the fire brigade the following should be considered:

a. the location and number of site access points;

b. the design of the internal roadways with respect to width, radii of bends, gradients, clearance between and under buildings;

c. the weight and turning circle of the fire appliances.

7.4 Health Building Note (HBN) 45 – 'External works for health buildings' provides guidance on the design and construction of hospital roads.

Requirement

7.5 A minimum of two site access points, suitable for use by the fire brigade, should be provided for fire appliances. Their location should be agreed with all relevant authorities.

One fire brigade access point may be an emergency access point dedicated solely for fire brigade use

7.6 New hospital roads which may be used by fire appliances should comply with the guidance in HBN 45 and that in Table 8.

Table 8 Typical vehicle access route specification[1]

Appliance type	Min width of road between kerbs	Min width of gateways	Min turning circle between kerbs	Min turning circle between walls	Min clearance height	Min carrying capacity (tonnes)[2]
Pump	3.7 m	3.1 m	16.8 m	19.2 m	3.7 m	12.5
High reach	3.7 m	3.1 m	26.0 m	29.0 m	4.0 m	17.02

Notes

1. Fire appliances are not standardised. Some fire services have appliances of greater weight or different size. In consultation with the fire authority, building control authorities may adopt other dimensions in such circumstances.
2. Because the weight of high reach appliances is distributed over a number of axles, it is considered that their infrequent use of a carriageway or route designed to 12.5 tonnes should not cause damage; however, structures such as bridges should have the full 17 tonnes capacity.

Access around the hospital

7.7 Access around a hospital is required to enable high reach appliances, such as turntable ladders and hydraulic platforms, to be used, and to enable pumping appliances to supply water and equipment for fire-fighting and rescue activities.

Requirement

7.8 Where access is provided to an elevation in accordance with Table 9, overhead obstructions should be avoided in the zone indicated in Figure 26.

7.9 Turning facilities should be provided in any dead-end route that is more than 20 metres long. This can be by hammerhead or turning circle, designed on the basis of Table 8.

7.10 Access for fire appliances to hospitals not fitted with fire mains should comply with the guidance in Table 9.

Table 9 Fire brigade access around hospitals not fitted with fire mains

Total floor area m²	Height of top storey above ground (m)	Provide vehicle access to:	Type of appliance
up to 2000	up to 9	within 45 metres	pump
	over 9	15% of perimeter	high reach
2000 to 8000	up to 9	15% of perimeter	pump
	over 9	50% of perimeter	high reach
8000 to 16,000	up to 9	50% of perimeter	pump
	over 9	50% of perimeter	high reach
16,000 to 24,000	up to 9	75% of perimeter	pump
	over 9	75% of perimeter	high reach
over 24,000	up to 9	100% of perimeter	pump
	over 9	100% of perimeter	high reach

Note
The total floor area is the aggregate of all floors within the building.

Access and facilities for the fire brigade

7.11 In low-rise hospitals without deep basements, the needs of fire brigade access will be met by a combination of the normal means of escape, and the measures required for vehicular access around the hospital.

7.12 The requirements for additional facilities for the fire brigade are determined by:

a. the height of the building;

b. the depth of basements;

c. floor area;

d. the provision of hospital streets.

7.13 The additional facilities which may be required are:

a. fire mains;

b. fire-fighting shafts.

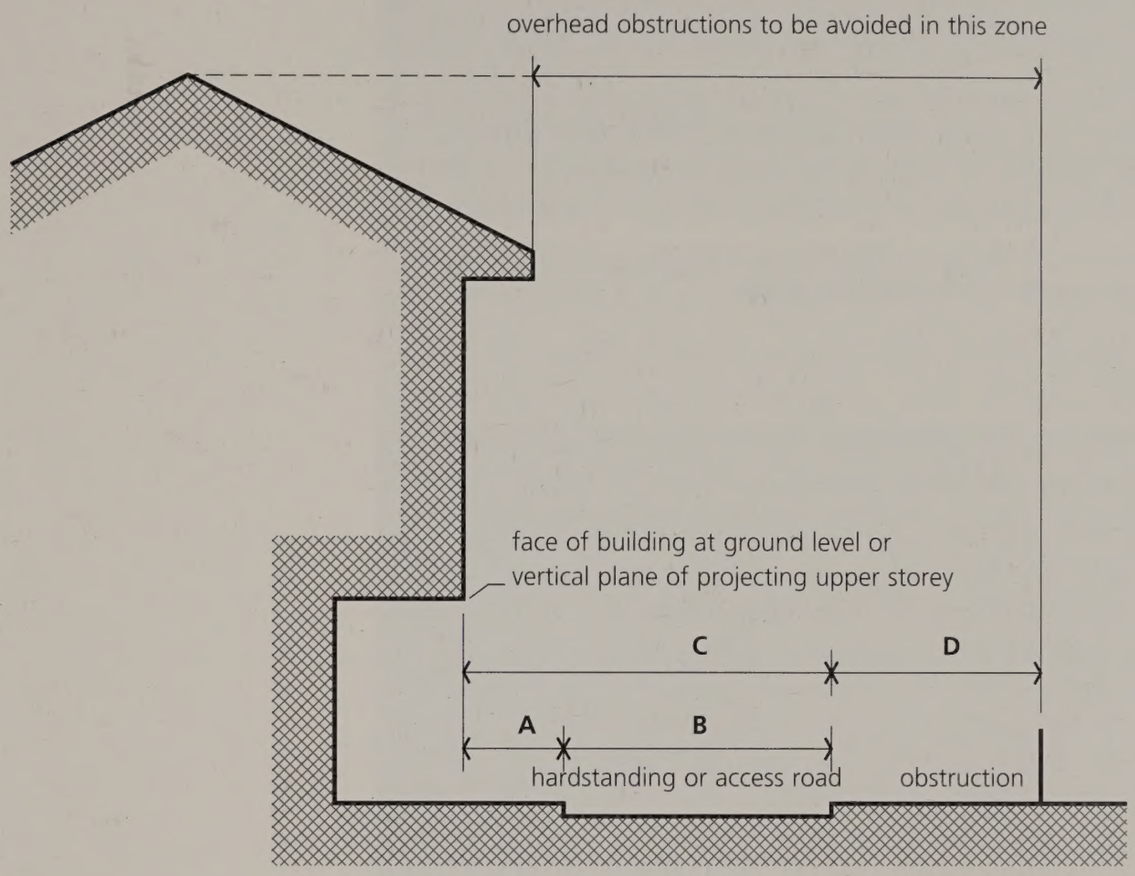
Hospitals not provided with hospital streets

Requirement

7.14 Hospitals five or more storeys high, or with a basement at more than 10 metres below ground or access level, should be provided with fire-fighting shafts containing fire-fighting lifts.

7.15 Hospitals with a storey of 600 m² or more, together with a floor over three storeys above ground or access level, should be provided with fire-fighting shaft(s) which need not include fire-fighting lifts.

Figure 26 Relationship between building and access roads or hardstandings for high reach appliances (Paragraph 7.8)



	Type of appliance	
	Turntable ladder Dimension (m)	Hydraulic platform Dimension (m)
A. Maximum distance of near edge of hardstanding from building	4.9	3.0
B. Minimum width of hardstanding	5.0	5.5
C. Minimum distance of further edge of hardstanding from building	10.0	7.5
D. Minimum width of unobstructed space (for swing of appliance platform)	N/A	2.2

Note:
Hardstanding for high reach appliances should be as level as possible and should not exceed a gradient of 1 in 12

7.16 Hospitals with two or more basement storeys, each exceeding 1000 m² in area, should be provided with fire-fighting shaft(s) which need not include fire-fighting lifts.

7.17 Access for fire appliances where dry fire mains are provided should be within 18 metres of each fire main inlet connection point. The inlet should be visible from the appliance.

7.18 Access for fire appliances where wet mains are provided should be to within 18 metres, and within sight, of a suitable entrance giving access to the main, and in sight of the inlet for the emergency replenishment of the suction tank for the main.

Number and location of fire-fighting shafts

Requirement

7.19 The number of fire-fighting shafts required should be such that there is at least one for every 1000 m² (or part thereof), or if the hospital is fitted with sprinklers, the number of fire-fighting shafts should comply with Table 10.

Table 10 Location of fire-fighting shafts (Hospitals provided with sprinklers)

Floor area of largest storey over 20 metres above ground level (m²)	Minimum number of fire-fighting shafts
Less than 1000	1
1000 to 2000	2
Over 2000	2 plus 1 for every additional 1500 m² or part thereof

7.20 In addition, fire-fighting shafts should be located so that every part of every storey, other than fire brigade access level, is no more than 60 metres from the entrance to a fire-fighting lobby, measured along a route that is suitable for laying hose.

Design and construction of fire-fighting shafts

7.21 Fire-fighting stairways and lifts should be approached from inside the hospital through a fire-fighting lobby.

7.22 Fire-fighting shafts should be equipped with fire mains having outlet connections and valves in every fire-fighting lobby except at access level.

7.23 Fire-fighting shafts should be designed, constructed and installed in accordance with the recommendations in the following sections of BS5588: Part 5:

a. Section 2 – Planning and construction;

b. Section 3 – Fire-fighting lift installation;

c. Section 4 – Electrical services.

Hospitals provided with a hospital street

Requirement

7.24 Fire-fighting shafts are not required in hospitals provided with hospital streets.

7.25 All hospital streets should have fire main outlets located at department entrances, so that every part of every storey is no more than 60 metres from a fire outlet connection, measured along a route which is suitable for laying hose.

7.26 In hospitals five or more storeys high, or hospitals with a basement at more than 10 metres below ground or fire service access level, lifts for use by the fire brigade are required. These should be:

a. located within the hospital street immediately adjacent to a stairway;

b. accessed directly off the hospital street; and

c. within 18 metres of an entrance suitable for use by the fire brigade.

Fire mains

7.27 A fire main should be located in every fire-fighting shaft, or as required by paragraph 7.25 above.

7.28 In hospitals with a floor over 60 metres above ground or access level, wet rising mains should be provided. Where fire mains are provided in hospitals which are lower than this, either wet or dry mains are suitable.

7.29 Wet or dry fire mains should be designed and installed in accordance with BS5306: Part 1.

First-aid fire-fighting equipment

7.30 Generally there should be two water extinguishers or extinguishers of an equivalent medium, of 9 litre capacity or the equivalent, for every 400 m^2 or part thereof. Extinguishers using CO_2 or other media should be provided as required. Fire blankets should be provided in all cooking and pantry areas. Guidance on the means of extinguishing various classes of fire is provided in Firecode: HTM 83 – 'Fire safety in healthcare premises: General fire precautions'.

Requirement

7.31 Hand-held extinguishers, fire blankets and hose reels should be provided as necessary.

7.32 Portable extinguishers should comply with BS5423 and be inspected and maintained in accordance with BS5306: Part 3.

7.33 Hose reel installations, if provided, should conform to the relevant section of BS5306: Part 1.

Venting of basements

7.34 In addition to the measures above there may be a need in case of fire to remove heat and smoke from basements. In a fire involving a basement, the products of combustion tend to escape via stairways, making access difficult for the fire brigade. Venting can reduce this problem, improve visibility and lower temperatures, making access for the fire brigade less difficult.

7.35 Smoke outlets provide a route for heat and smoke to escape to the open air from the basement level(s). They can also be used by the fire brigade to let cooler air into the basement.

Requirement

7.36 Smoke outlets connected directly to the open air should be provided from every basement storey, except for any basement storey which:

a. has a floor area of less than 200 m^2;

b. is not more than 3 metres below the adjacent ground level.

7.37 Smoke outlets should:

a. be positioned at high level in the space they serve;

b. be evenly distributed around the perimeter of the building;

c. discharge into the open air outside the building.

7.38 In each basement compartment/sub-compartment the combined cross-sectional area of all smoke outlets should be not less than 2.5 per cent of the compartment/sub-compartment floor area.

7.39 If the outlet terminates at a point that is not readily accessible, it should be kept unobstructed and covered with a metal grille or louvre.

7.40 If the outlet terminates at a point which is readily accessible, it may be covered by a suitably indicated panel or pavement light which can be broken out or opened.

7.41 Outlets should not prejudice the use of escape routes.

Mechanical smoke extract

7.42 As an alternative to natural venting, providing the basement is fitted with a sprinkler system to BS5306: Part 2, a mechanical extract system may be provided.

7.43 The air extraction system should provide at least ten air changes per hour and be capable of handling gas temperatures of up to 400°C for not less than one hour. It should come into operation automatically on the activation of:

a. the sprinkler system; or

b. the alarm and detection system.

Construction of outlet ducts and shafts

7.44 Outlet ducts and shafts, including any bulkheads over them, should be enclosed in non-combustible fire-resisting construction.

7.45 Where there are natural smoke outlet shafts from different basement compartments of the same basement storey, or from different basement storeys, they should be separated from each other by non-combustible fire-resisting construction.

Appendix A – Periods of fire resistance

A1. The performance of those elements of the building which are required to achieve a specified period of fire resistance is determined by reference to BS476: Parts 20 to 24: 1987 (or in respect of items assessed before 1 January 1988, BS476: Part 8). Performance is assessed against one or more of the following criteria:

a. resistance to collapse (load-bearing capacity), which applies to load-bearing elements;

b. resistance to fire penetration (integrity) which applies to fire separating elements; and

c. resistance to the transfer of excessive heat (insulation), which applies to fire separating elements.

A2. The table below summarises the specific requirements for each element in terms of the three performance requirements above.

Specific periods of fire resistance for building elements

Part of building	Load bearing capacity (minutes)	Integrity (minutes)	Insulation (minutes)	Method of exposure
Structural frame beam or column	see Table 5	-	-	exposed faces
Load-bearing wall	see Table 5	-	-	each side separately
Compartment floor	60	60	60	from the underside
Compartment wall		60*	60*	each side separately
Single-storey hospitals		30	30	
Sub-compartment wall		30	30	each side separately
Wall to a fire hazard room		30	30	each side separately
Protected shaft	60	60	60	each side separately
Fire-fighting shafts:	120	120	120	from side remote from shaft
a. construction separating the shaft from the building	60	60	60	from shaft side
b. construction separating fire-fighting stairway from fire-fighting lift shaft and fire-fighting lobby	60	60	60	each side separately
Cavity barrier	not applicable	30	15	each side separately
Fire-resisting ceiling as described in paragraphs 5.21 and 6.30 (2)	not applicable	30	30	from below

* may be reduced if sprinklers are installed; see paragraph 6.8

Notes:

BS 476 tests – Part 21 for load-bearing elements

Part 22 for non-load-bearing elements

Part 24 for ductwork

BS 476: Part 23: ' Fire protecting suspended ceilings' is not appropriate for hospitals.

Appendix B – Doors and doorsets

B1. Fire doors should have the appropriate performance as indicated in Table B1. In the table the doors are identified by their performance under BS476: Part 22, in terms of integrity for a period of minutes, for example FD30. A suffix (S) is added for doors where restricted smoke leakage at ambient temperatures is needed. Unless pressurisation techniques complying with BS5588: Part 4 are used, doors with the suffix "S" should also have a leakage rate not exceeding 3 m^3/m/hour (head and jambs only) when tested at 25Pa under BS476: Part 31.1. The method of test exposure is from each side of the doors separately, except in the case of lift doors, which are tested from the landing side only.

Table B1 Location of fire doors

Location of door	Minimum period of fire resistance
Sub-compartment wall	FD30S
Fire hazard rooms	FD30S
In a compartment wall	FD30S – single-storey hospitals FD30S – storeys up to 12 metres above ground in hospitals fitted with sprinkler FD60S – elsewhere
To a protected shaft containing a lift, or stairway or escalator	
i. accessed from a hospital street	FD30S
ii. elsewhere	FD30S to each of the two sets of doors to the lobby
To a protected shaft containing chutes, ducts and pipes	FD60S
Within a cavity barrier	FD30

Door closers

B2. With the exception of fire doors to patient bedrooms and doors which are kept locked shut, fire doors should be fitted with an automatic self-closing device.

B3. In patient bedrooms, self-closing devices may impede patient evacuation from the bedroom in a fire emergency.

B4. Within hospitals it is acceptable for fire doors on circulation routes to be held open on automatic door releases provided that all of the following criteria can be satisfied:

a. the door release mechanism should conform to BS5839: Part 3: 1988 and be fail-safe (that is, in the event of a fault or loss of power the release mechanism should be triggered automatically);

b. all doors fitted with automatic door releases should be linked to the alarm and detection system;

c. all automatic door releases within a compartment/sub-compartment should be triggered by all of the following:

   (i) the actuation of **any** automatic fire detector within the compartment/sub-compartment;

   (ii) the actuation of any manual fire alarm call point within the compartment/sub-compartment;

   (iii) any fault in the fire warning system;

   (iv) any loss of power to the fire warning system;

d. automatic door releases must be provided with a ready means of manual operation from a position at the door;

e. each door fitted with an automatic door release should be closed at a predetermined time each night and remain closed throughout sleeping hours. If for reasons of management this is impracticable, it should be the specific responsibility of a competent member of staff to operate the release mechanism at least once a week to ensure that:

   (i) the mechanism is working effectively;

   (ii) the doors close effectively onto their frames.

Transfer grilles

B5. Transfer grilles should not be provided in fire-resisting doorsets. Fire doors should not be undercut.

Identification

B6. All fire doors, including each leaf of double doors, should be provided with an identification disc. The disc should be a minimum of 45 mm in diameter, clearly indicating the fire-resisting standard of the door, for example FD30, FD30S, FD60 etc.

Doors on escape routes

B7. Fire doors on escape routes should be side-hung or pivoted. Revolving doors, turnstiles and shutters are not acceptable on escape routes and should not be used.

B8. Sliding doors are acceptable on escape routes provided they convert to outward-opening doors when subjected to reasonable pressure from any direction. In the case of powered sliding doors they should in addition be provided with a monitoring system to ensure that they fail safe to the fully open position in the event of a power failure.

B9. Door swings should not obstruct the circulation space or escape route designed width. However, doors to cupboards etc which are normally locked may open onto circulation routes, but it is recommended that such doors should open through 180° to avoid obstruction.

B10. Fire doors across escape routes providing alternative means of escape should be double-swing and those across escape routes providing single direction of escape should open in the direction of escape.

B11. Fire exit doors to rooms containing more than 30 persons should open outwards from the room.

B12. Fire doors across circulation routes should be fitted with glazed observation panels to the upper part of the door.

Additional guidance

B13. Additional guidance on the specification of doors and doorsets is available in HTM 58 – 'Doorsets'.

Appendix C – Thermoplastic materials

C1. A thermoplastic material means any synthetic polymeric material which has a softening point below 200°C if tested to BS2782: Part 1: Method 120A: 1976. Specimens for this test may be fabricated from the original polymer where the thickness of material of the end product is less than 2.5 mm.

C2. A thermoplastic material in isolation cannot be assumed to protect a substrate, when used as a lining to a wall or ceiling. The surface rating of both products must therefore meet the required classification. If, however, the thermoplastic material is fully bonded to a non-thermoplastic substrate, then only the surface rating of the composite will need to comply.

C3. Concessions are made for thermoplastic materials used for windows, rooflights, and lighting diffusers. They are described in paragraphs 6.56 to 6.62.

C4. For the purposes of the requirements of paragraphs 6.51 to 6.62, thermoplastic materials should either be used according to their classification 0–3, under the BS476: parts 6 and 7 tests, if they have such a rating, or they may be classified TP(a) rigid, TP(a) flexible, or TP(b) according to the following methods:

TP(a) rigid:

(i) rigid solid pvc sheet;

(ii) solid (as distinct from double- or multiple-skin) polycarbonate sheet at least 3 mm thick;

(iii) multi-skinned rigid sheet made from unplasticised pvc or polycarbonate which has Class 1 rating when tested to BS476: Part 7: 1971 or 1987;

(iv) any other rigid thermoplastic product, a specimen of which, when tested to BS2782: 1970 as amended in 1974: method 508A, performs so that the test flame extinguishes before the first mark, and the duration of flaming or afterglow does not exceed 5 seconds following removal of the burner.

TP(a) flexible:

flexible products not more than 1 mm thick which comply with the Type C requirements of BS5867: Part 2 when tested to BS5438, Test 2 1989 with the flame applied to the surface of the specimens for 5, 15, 20 and 30 seconds respectively, but excluding the cleansing procedure; and

TP(b):

(i) rigid solid polycarbonate sheet products less than 3 mm thick, or multiple skin polycarbonate sheet products which do not qualify as TP(a) by test; or

(ii) other products which, when a specimen of the material between 1.5 and 3 mm thick is tested in accordance with BS2782: 1970, as amended in 1974: method 508A, has a rate of burning which does not exceed 50 mm/minute. (If it is not possible to cut or machine a 3 mm thick specimen from the product, a 3 mm test specimen can be moulded from the same material as that used for the manufacture of the product.)

Appendix D – Fixing of fire dampers

D1. All fire dampers should be installed so that they maintain their integrity against the passage of fire for the required period of fire resistance. A fire damper should be adequately fixed into or to the construction it is protecting. A fire damper which is supported only by the ductwork in which it is located, or by timber battens, frames or other methods which do not provide the fire resistance required, is not acceptable.

D2. Fire dampers provided in 30 minute fire-resisting ceilings should be adequately supported either by the ceiling or from the structural soffit. In the ceiling situation it also essential to ensure that the integrity of the fire-resisting ceiling is maintained. It is not acceptable to form an opening, install a diffuser or grille and fit a fire damper above, if the gap between the ceiling opening and the fire damper does not achieve 30 minutes fire resistance.

Appendix E – Construction and fixing of cavity barriers

E1. Every cavity barrier should be constructed to provide at least 30 minutes fire resistance, except for a cavity barrier in a stud wall or partition which may be formed of:

a. steel at least 0.5 mm thick; or

b. timber at least 38 mm thick; or

c. polythene sleeved mineral wool, or mineral wool slab, in either case under compression when installed in the cavity; or

d. calcium silicate, cement-based or gypsum-based boards at least 12.5 mm thick.

E2. A cavity barrier may be formed by any construction provided for another purpose if it meets the provisions for cavity barriers.

E3. Cavity barriers should be tightly fitted to rigid construction and mechanically fixed in position wherever possible. Where this is not possible (for example in the case of a junction with slates, tiles, corrugated sheeting or similar materials) the junction should be fire-stopped.

E4. Cavity barriers should also be fixed so that their performance is unlikely to be made ineffective by:

a. movement of the building due to subsidence, shrinkage or temperature change, and movement of the external envelope due to wind;

b. collapse in a fire of any services penetrating them;

c. failure in a fire of their fixings;

d. failure in a fire of any material or construction which they abut. For example, if a suspended ceiling is continued over the top of a fire-resisting wall or partition, and direct connection is made between the ceiling and the cavity barrier above the line of the wall or partition, premature failure of the cavity barrier can occur when the ceiling collapses. However, this does not arise if the ceiling is designed to provide fire protection of 30 minutes or more.

Appendix F – Fire drawings

This is an operational requirement and cannot be enforced through the current Building Regulations

F1. To adequately assess the fire precautions at design stage, a set of fire drawings should be prepared using symbols based on BS1635.

F2. In order to adequately assess the compliance with the requirements of this guidance, the drawings should show in sufficient detail the detection and alarm systems, the means of escape, the structural fire precautions, the portable and fixed fire-fighting equipment, smoke control/ventilation arrangements, and access and facilities for the fire brigade.

F3. A typical set of fire drawings would comprise of:

a. a location plan;

b. a site plan;

c. a floor plan of each storey, prepared at a scale of not less than 1:200;

d. a floor plan of each department, prepared at a scale of not less than 1:100 and preferably at a scale of 1:50;

e. a set of elevations.

F4. During the construction of a project, variations to the structure and the layout frequently occur; these variations should not subvert the integrity of the agreed fire precautions. The variations should be recorded on the fire plans so that on completion an "as built" set of drawings can be prepared.

F5. The "as built" drawings should be held by the hospital, so that any proposed future alterations can be checked against the fire drawings to ensure that the integrity of fire safety is maintained in accordance with the recommendations in this document.

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